VOL. XXXII NEW YORK—THURSDAY, APRIL 29, 1915—CHICAGO No. 17

The AUTOMOBILE

# Further Simplify Car Design

## S. A. E. Cuts Cotter Pins 300 to 41—Four Fan Belt Widths — Adds Two Carbureter Sizes

By A. Ludlow Clayden


S. A. E. STANDARDS COMMITTEE IN SESSION

1—R. S. Lane, Engineer, Hyatt Roller Bearing Co.; 2—H. S. Pierce, Mechanical Engr., Link Belt Co.; 3—E. E. Sweet, Consulting Engr., Cadillac Motor Car Co.; 4—F. L. Morse, President and Treas., Morse Chain Co.; 5—F. M. Germane, Asst. Gen. Mgr., Standard Roller Bearing Co.; 6—H. D. Church, Truck Engr., Packard Motor Car Co.; 7—W. H. Allen, Mgr. Truck Tire Dept., The B. F. Goodrich Co.; 8—C. E. Clemens, Mechanical Engr., Perfection Spring Co.; 9—R. J. Nightingale, Mgr. Auto Sales, Willard Storage Battery Co.; 10—Russell Hoopes, Superintendent, Hoopes Bros. & Darlington, Inc.; 11—B. Nadall, Sales Engr., Stewart-Warner Speedometer Corp.; 12—A. L. McMurtry, Consulting Engr.; 13—J. G. Utz, Consulting Engr., Perfection Spring Co.; 14—K. W. Zimmerschied, Metallurgist, General Motors Co.; 15—A. L. Clayden, Engineering Editor, THE AUTOMOBILE, Class Journal Co.; 16—H. G. Osburn, Consulting Engr., National Metal Molding Co.; 17—R. M. Anderson, Chief Engineer, Stromberg Motor Devices Co.; 18—C. B. Whittelsey, Vice-president, Hartford Rubber Works Co.; 19—W. H. Palmer, Jr., Assistant Engineer, Electric Storage Battery Co.; 20—Stenographer; 21—N. B. Pope, Technical Editor, Automobile Topics; 22—D. L. Gallup, Professor, Gas Engineering and Consulting Engineer, Worcester Polytechnic Institute; 23—J. J. Aull, Mechanical Engr., The Lunkenheimer Co.; 24—A. C. Woodbury, Recorder of Standards Committee, S. A. E.; 25—C. W. Findeisen, Sales Mgr., Findeisen & Krops Mfg. Co.; 26—C. F. Clarkson, Sec. and General Mgr., S. A. E.

DETROIT, MICH., April 22—The Standards Committee of the Society of Automobile Engineers met today in accordance with the program announced last week the 2 days previous having been spent in meetings of the various divisions and sub-divisions. In general, there was a great deal of progress reported, but not so much was passed and actually added to the standards of the society. There were some distinctly good discussions on subjects of vital interest and importance, notably on the question of what constitutes a glaring headlight, and how glare can be avoided.

Eight divisions made reports which show a considerable advancement in the work, except in one instance, the research division, where it was decided that the work in hand, namely, the formulation of a good engineering taxation formula, is impossible. It was desired to base this formula on the relative road destructiveness of vehicles. The miscellaneous division and the carbureter division have made reports which can be acted upon at the summer session. The other divisions to report were those on electrical equipment, discussing glare; electric vehicle, discussing the sclerescope test for tires; chain division, iron and steel and international standards.

MISCELLANEOUS DIVISION

1—W. F. Herst, Factory Manager, Brown-Lipe Gear Co. 2—J. G. Utz, Consulting Engineer, Perfection Spring Co. 3—W. A. Frederick, Chief Engineer, Continental Motor Mfg. Co. 4—N. B. Pope, Technical Editor, Automobile Topics. 5—E. E. Sweet, Consulting Engineer, Cadillac Motor Car Co. 6—E. H. Ehrman, Secretary and Factory Manager, Chicago Screw Co. 7—W. R. Strickland, Chief Engineer, Peerless Motor Car Co.

One of the most important new standards adopted for submission to the next general meeting was the latest work of the miscellaneous division, which has been to reduce the 300 sizes of cotter pins in use to some forty-one which cover all requirements. The scheme for doing this was to take three articles needing cotter pins, namely, yoke and rod ends, S. A. E. standard bolts, and U. S. A. standard bolts. It is necessary to have at least two lengths of pin to each diameter, and in some cases the U. S. A. bolts call for different length to those needed by the S. A. E. bolts although the diameter of cotter pin is the same. The table shows the suggested range of sizes which appear to cover every possible automobile requirement and will be put in use shortly. There was practically no discussion of the new standard, since all present at the meeting were agreed as to its common sense.

### Fan Belt Widths Fixed

Another task of the miscellaneous division has been to find the number of sizes of fan belting in use and to reduce the widths to a smaller but sufficient range. Four sizes were found to be sufficient, 3-4, 1, 1 1-4 and 1 1-2 inch. It was remarked by Chairman J. G. Utz that there were a few belts in use of greater width, but that these were used only where a generator or some other accessory was driven off the same belt as the fan and the instances of this practice were so rare that they became scarcely a fit subject for standardization. On the question of thickness of belt, there were so many different kinds of belt, and so many different methods of making that

### Cotter Pins

| B. W. Gage | | 13 | 12 | 11 | 10 | 8 | 6 |
|---|---|---|---|---|---|---|---|
| Nominal Diameter | 1/16 | 3/32 | 1/8 | 1/4 | 3/8 | 11/32 | 11/32 |
| No. Drill for Hole | 48 | 36 | 30 | 28 | 21 | 11 | 2 |
| Length of Shank: | | | | | | | |
| 1/16 | x | | | | | | |
| 1/8 | x | | | | | | |
| 1/4 | x | x | | | | | |
| 3/8 | x | x | | | | | |
| 1/2 | x | x | | | | | |
| 5/8 | | x | xxx | x | | | |
| 1 | | x | x | x | | | |
| 1 1/4 | | x | x | x | | | |
| 1 1/2 | | | xx | x | xxx | | |
| 1 3/4 | | | xx | x | x | | |
| 1 1/2 | | | | x | xxx | | |
| 1 1/4 | | | | xxx | x | x | |
| 1 1/2 | | | | xx | xx | x | |
| 2 | | | | | xx | x | x |
| 2 1/2 | | | | | xxx | x | x |
| 2 1/2 | | | | | | xx | xx |
| 2 3/4 | | | | | | | xx |
| 3 | | | | | | | xx |

NOTE: x = Short series.
xx = Long series.
xxx = Questionable sizes.
See Table II for applications of these sizes.

COMMERCIAL SPRINGS DIVISION

1—C. V. McRaig. 2—C. W. McKinley, Chief Engineer, Willys-Overland Co. 3—Chester E. Clemens, Mechanical Engineer, Perfection Spring Co. 4—C. F. W. Rys, Metallurgical Engineer, Carnegie Steel Co. 5—A. C. Bergmann, Efficiency Engineer, Standard Oil Co.

RESEARCH DIVISION

1—C. B. Veal, Professor of Machine Design, Purdue University. 2—D. L. Gallup, Professor Gas Engineering and Consulting Engineer, Worcester Polytechnic Institute. 3—R. M. Anderson, Chief Engineer, Winton Motor Car Co. 4—H. L. Connell, Member Engineering Faculty, Automobile Department, Central Continuation School

it was advisable to leave the subject of thickness alone. There was no discussion on this proposed standard.

### Two New Carbureter Sizes

The carbureter fittings division had several subjects for discussion, the foremost being the desire expressed by some motorcycle and marine motor manufacturers for a .5-inch and a 5-8-inch S. A. E. standard size. This was granted by the meeting and it was understood that the proportions of these smaller instruments would be in accordance with those set for the existing standards. Three larger sizes are also needed, so it was stated, and the division is now at work deciding their proportions. The suggested dimensions were stated, but there was no discussion upon them and so they stand in abeyance till the division's report is complete. It is expected to present this part to the general meeting of the S. A. E. in June.

In presenting his report, the chairman of the division, J. J. Aull, said that there had been a complaint concerning the dimensions for side outlet carbureter flanges, the case for the three-bolt flange being argued. Since the case was isolated and not in agreement with the

## Applications of Standard Cotter Pins

| Body Size of Bolt or Pin | Cotter Pins for Yoke and Rod Ends | | | | Cotter Pins for S. A. E. Bolts | | | | Cotter Pins for U. S. S. Bolts | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pin Dia. | Pin Length | | Drill No. | Pin Dia. | Pin Length | | Drill No. | Pin Dia. | Pin Length | | Drill No. |
| | | Short | Long | | | Short | Long | | | Short | Long | |
| 1/16 | 1/16 | 1/16 | 1/2 | 48 | | | | | | | | |
| 1/8 | 1/16 | 7/16 | 3/8 | 48 | 1/16 | 3/8 | 3/8 | 48 | 1/16 | 1/2 | 3/8 | 48 |
| 5/32 | 3/32 | 1/2 | 1/2 | 36 | 1/16 | 1/2 | 1/2 | 48 | 1/16 | 5/8 | 1/2 | 48 |
| 3/16 | 3/32 | 1/2 | 3/4 | 36 | 3/32 | 1/2 | 1/2 | 36 | 3/32 | 1/2 | 5/8 | 36 |
| 7/32 | 3/32 | 3/4 | 7/8 | 36 | 3/32 | 5/8 | 3/4 | 36 | 3/32 | 3/4 | 1 | 36 |
| 1/4 | 3/32 | 7/8 | 1 | 36 | 3/32 | 3/4 | 7/8 | 36 | 3/32 | 7/8 | 1 1/8 | 36 |
| 9/32 | | | | | 1/4 | 7/8 | 1 1/8 | 28 | 7/64 | 1 | 1 1/4 | 30 |
| 5/16 | | | | | 1/4 | 1 | 1 1/4 | 28 | 7/64 | 1 1/8 | 1 1/8 | 30 |
| 11/32 | | | | | | | | | 7/64 | 1 1/8 | 1 1/8 | 30 |
| 3/8 | | | | | 1/4 | 1 1/8 | 1 3/8 | 28 | 1/4 | 1 1/2 | 1 1/8 | 28 |
| 7/16 | | | | | 1/4 | 1 1/4 | 1 1/2 | 28 | 9/64 | 1 3/8 | 1 1/2 | 21 |
| 1 | | | | | 1/4 | 1 1/2 | 1 3/4 | 28 | 9/64 | 1 3/8 | 2 | 21 |
| 1 1/4 | | | | | 11/64 | 1 3/4 | 2 | 11 | 11/64 | 1 1/2 | 2 1/2 | 11 |
| 1 1/2 | | | | | 11/64 | 1 3/4 | 2 1/2 | 11 | 11/64 | 2 | 2 1/2 | 11 |
| 1 3/4 | | | | | 13/64 | 2 | 2 1/2 | 2 | 13/64 | 2 1/2 | 2 3/4 | 2 |
| 1 1/2 | | | | | 13/64 | 2 1/2 | 2 3/4 | 2 | 13/64 | 2 1/2 | 3 | 2 |

experience of the majority, the meeting decided that the standard approved at the winter meeting in New York should be perpetuated.

On the chairman's recommendation it was also agreed that a limitation of the distance between the cylinder block and the center line of the carbureter, on side-flange carbureters, was undesirable for standardization as it placed too much limitation on the detail design.

Another detail appertaining to carbureters which it is pro-

INTERNATIONAL STANDARDS DIVISION

1—K. W. Zimmerschied, Metallurgist, General Motors Co. 2—A. L. McMurtry, Consulting Engineer. 3—A. L. Clayden, Engineering Editor, THE AUTOMOBILE, Class Journal Co. 4—Coker F. Clarkson, Secretary and General Manager, Society of Automobile Engineers. 5—W. H. Allen, Mgr. Truck Tire Dept., B. F. Goodrich Co.. 6—C. W. Hartley. 7—C. B. Whittelsey, Vice-President, Hartford Rubber Works Co. 8—J. E. Hale, Experimental Engineer, Goodyear Tire & Rubber Co.

CARBURETER FITTINGS DIVISION

1—A. B. Browne, Consulting Engineer. 2—Geo. M. Holley, President, Holley Bros. Co. 3—J. J. Aull, Mechanical Engineer, The Lunkenheimer Co. 4—V. R. Heftler, President and General Manager, Zenith Carbureter Co. 5—C. W. Findeisen, Sales Manager, Findeisen & Kropf Mfg. Co. 6—C. P. Grimes, Technical Engineer, Wheeler & Schebler.

posed to standardize is the dimensions of the hot-air muff on the exhaust manifold.

### Scientific Taxation Rating Hopeless

For a considerable time past the research division have been trying to discover some method of rating automobiles and other road vehicles which will give a figure of merit showing the relative destructiveness of road surface characteristic of any vehicle. In presenting his report, D. L. Gallup said that, with extreme reluctance, the division asked to be released from its labors on this subject, because it had arrived at the unanimous conclusion that it was impossible to find a formula of sufficient simplicity to make its use practicable. Records which might give experimental data are impossible to obtain either here or abroad, and it seems that conditions of traffic and of road making are changing so rapidly that it would not be possible to obtain proper data by any amount of work.

In presenting the report of the electrical equipment division no new standards were offered but it was reported that the question of getting some standard layout for starting motors with flywheel drive was being considered. Dimensions of fuses was another electrical matter that had already been a subject of standardization and that the details of the brass ends of fuse containing tubes was being considered.

It has been found that, despite the S. A. E. standard for bulb cases, the sockets had not become fully standardized, and also, where plugs were used for trouble lamps or what not, they were often unlike the standard bulb base, which is absurd. These matters are receiving attention.

Chairman K. W. Zimmerschied stated that he and several other members of the society had had an interview with the Detroit police commissioner and that the latter had said the cure for headlight troubles was to give up the present type of lamp with a parabolic reflector and a concentrated beam of light, substituting a much greater volume of diffused light spread through opalescent or ground glass. Previous to this point in the discussion the question of so setting the lamps that their rays were thrown slightly downwards was mentioned; this scheme did not have the approval of the Detroit police commissioner, because he considered it insufficiently fundamental.

### The Downward-Pointing Ray

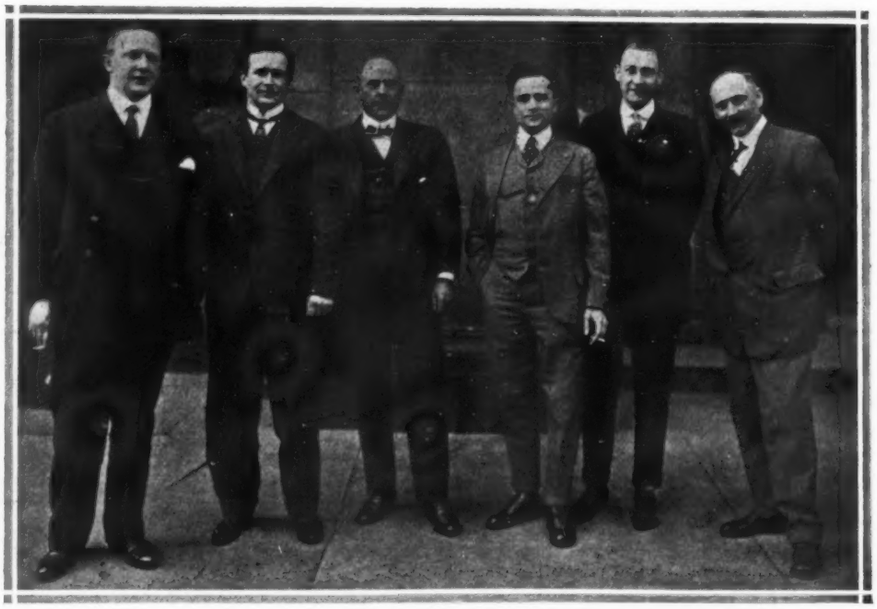
From the view that diffused light was a practicable substitute for concentrated beams there were several dissentients, and A. L. Riker remarked that he was sure the commissioner had never driven in the country after dark with diffused light only. In Mr. Riker's opinion the case was met with complete satisfaction when the lamps were depressed so that the focal ray struck the ground some 100 feet in front of the car on a level road. He also thought the matter could be helped by a limitation of the maximum candlepower allowed—that is, candlepower of the naked bulb.

Chairman Zimmerschied discussed some road situations where the downward pointing ray failed to carry out its purpose and showed that there were conditions wherein it actually made matters worse.

Mention was made of the new law in New Jersey that no direct ray must rise more than 54 inches above the road surface. Several members gave experiences showing that bending down the lamp supports freed them from trouble with police on cars which had previously been stopped frequently.

Chairman Zimmerschied, in summing up, said that the discussion resolved itself into two questions: 1—What was the best test for glare? and 2—under what conditions should it be applied?

The worst case where glare or dazzle was most serious was the case of two cars meeting on a dark country road. The easiest case was that of a car running through lighted streets. Obviously what was glare in the former case might



CHAIN DIVISION

1—H. F. Funke, President, H. F. Funke & Co., Inc. 2—H. S. Pierce, Mechanical Engineer, Link Belt Co. 3—F. L. Morse, President and Treasurer, Morse Chain Co. 4—W. A. Rockenfield, Engineer and Sales Manager, American High Speed Chain Co. 5—J. R. Cautley, Engineer and Manager Chain Dept., Peter A. Frasee & Co., Inc. 6—W. W. Totman, Mechanical Engineer, Sales Dept., The Whitney Mfg. Co.

ELECTRIC VEHICLE DIVISION

1—F. A. Whitten, Chief Engineer, General Motor Truck Co. 2—E. P. Chalfant, Secretary, Electric Automobile Manufacturers' Assn. 3—Alex. Churchward, Vice-President, Gray & Davis, Inc. 4—T. H. Schoepf, General Engineer, Westinghouse Elec. & Mfg. Co. 5—A. J. Slade, Consulting Engineer. 6—W. H. Conant, Mgr. Detroit Branch, Gould Storage Battery Co. 7—A. C. Woodbury, Recorder of Standards Committee, S. A. E. 8—E. J. Ross, Jr., Mgr., Sales Engr. Dept., Edison Storage Battery Co. 9—T. L. Lee, Chief Engineer, North East Elec. Co. 10—Unidentified. 11—Bruce Ford, fourth Vice-President, Electric Storage Battery Co.

not be so in the latter. While the points raised were interesting and also important it was necessary to close the discussion owing to pressure of other business, but the spirited argument which took place promises a lively discussion for the summer meeting.

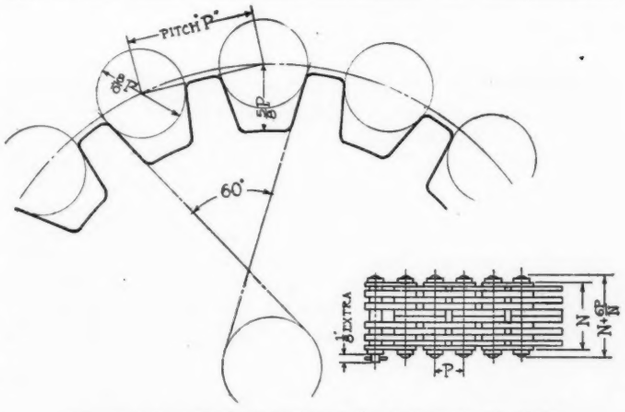
### Resiliency of Solid Tires

Another somewhat lively discussion took place on the suggestion by the Electric Vehicle division, that a sclerescope test be standardized for testing the resiliency of solid tires used for electric vehicles. The point at issue is that the tractive effort required to drive an electric car or truck is affected by the suitability of the tire for the road, and that a change of the rubber used can raise or lower the tractive force required. The sclerescope suggested consists of a tube containing a hammer or weight which is dropped against the tire, the tube being meanwhile held in an upright position with its base or open end in contact with the top of the tire tread. The weight is released and the distance of rebound measured, this giving a measure of the resiliency of the rubber.

There was immediate objection on the part of the tire makers, their representatives in the persons of W. H. Allen and C. B. Whittelsey pointing out that resiliency was not the only thing desired in a tire. The most resilient tire need not be the easiest from the tractive effort viewpoint, as instance the ideal case for rolling resistance of a hard steel tire on a hard steel rail. Thus on smooth paved streets a hard tire would show a lower tractive resistance than a softer and more resilient tire. Conversely, on rough cobble stones the highly resilient rubber would be better than the harder quality.

In reply to this criticism, A. J. Slade, chairman of the division, said that the electric vehicle users needed some easy test for tires. If the sclerescope were not going to give it the tire makers ought to come forward with a test which anyone could make and which would actually be of value. In reply, it was pointed out that tire makers themselves would be glad of such a test and the fact that a simple testing machine is not forthcoming is not due to any lack of work of investigation by the tire makers.

When it was first suggested that silent chains, such as are used in motor camshaft drives, might be standardized as to pitches and widths there was a general impression that the case was hopeless, owing to the number of differences between the practice of one manufacturer and another. However, despite this natural pessimism, the chairman of the division, F. L. Morse, was able to report substantial progress. The division has not yet got any standards ready for adoption, but it has some close recommendations for consideration,

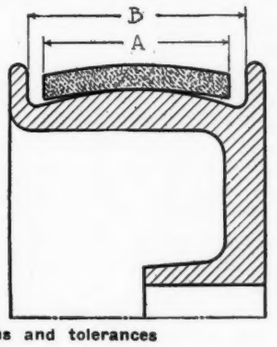



Suggested method of laying out silent type of chain

## Pulley for Fan Belt

Proposed Standard Dimensions

| Nominal Belt Width | Limits, Belt Width, A | Limits, Pulley Width, B |
|---|---|---|
| 3/4" | 23/32 to 25/32 | .870 to .880 |
| 1" | 31/32 to 33/32 | 1.120 to 1.130 |
| 1 1/4" | 1 7/32 to 1 9/32 | 1.370 to 1.380 |
| 1 1/2" | 1 15/32 to 1 17/32 | 1.680 to 1.690 |




Standard fan belt widths and tolerances

ELECTRIC EQUIPMENT DIVISION

1—W. H. Conant, Mgr., Detroit Branch, Gould Storage Battery Co. 2—Alex. Churchward, Vice-pres., Gray & Davis, Inc. 3—A. L. McMurtry, Consulting Engineer. 4—A. D. T. Libby, Engr. and Patent Attorney, Splitdorf Elec. Co. 5—T. L. Lee, Chief Engineer, North East Electric Co. 6—Unidentified. 7—W. L. Bliss, Chief Engineer, U. S. Light & Heating Co. 8—Russel Huff, Consulting Engineer, Packard Motor Car Co. 9—H. G. Osburn, Consulting Engineer, National Molding Metal Co.

and it is hoped that it may be possible to create some standards soon, possibly at the summer meeting. The drawing herewith shows suggestions only and engineers are warned against making use of it because it will probably be altered before final adoption. It is published solely to show the lines along which the division has been working and not by any means as adopted practice.

### Confusion with Bell Housings

The insistence upon the need for caution in publishing suggested standards, as mentioned above, was illustrated well by some bell housing standards which were published in suggested, and not final, form. One or two engineers reading the literature without proper care took it that the designs were standards and forthwith used them. The result was considerable trouble and confusion when the division afterwards found good reasons for making some alterations before setting up the standard bell housings. Chairman Zimmerschied reported to the meeting that there was a deadlock at present on the question of whether eight or ten bolts should be used in the three smallest sizes of bell housings. He hoped this could be cleared up before long.

### Iron and Steel

This report was extremely brief as it consisted of the addition of one new chrome nickel steel to the list of standard materials and the alteration of the vanadium content in another. It was also decided to discontinue the specification analysis for steel castings and a recommendation substituted that specifications of the American Society for Testing Materials be considered when it is desired to order steel castings to chemical specification.

Some fresh matter relating to heat treatment and alloy steels is in progress and will come up for report at the summer meeting.

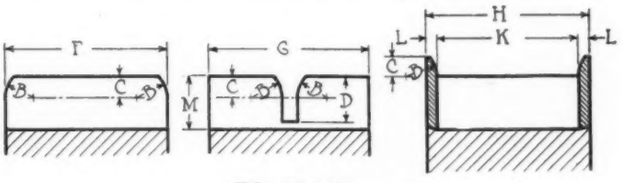
Chairman J. G. Utz of the miscellaneous division reported progress on a variety of small investigations. Speedometer drives and drives for governors were being considered but it appears that the standards set, if any, will have to be of fairly wide limits. The standards on mechanical tire pump drives are being redrafted, this being rendered necessary by reason of the introduction of electrical equipment subsequent to setting up the old standards.

The S. A. E. screw standard is to be amplified by setting a tolerance for the threads. Good progress is being made with the reduction of number of hose connections and clips. Mr. Utz said that the division hoped a very very small number of sizes would suffice to meet all requirements.

Standard dimensions for piston rings and ring grooves are now well advanced, and it remains to determine the depth of groove only. Widths and tolerances have been drawn up and it is thought that the dimensions suggested will prove universally acceptable.

Other matters in the hands of the division are: sections of brake and clutch linings; position of car, chassis and motor number plates; and standard license tags.

The first report of the newly-created international standards division was presented by Chairman A. L. Clayden, who announced that there had been one meeting at which it was decided to confine present attention to the matter of solid tires. Educational literature is to be prepared.




**Rim Sections**

| Chain Width No. | Width Over All Tension Members | F | | G | Pitch | C | B | D | H | K | L | M Minimum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Single Side Bar | Double Side Bar | | | | | | | | | |
| | N | N—.135 | N—.26 | N | P | P/4 | 3P/8 | P/2 | N+P | N+P/2 | P/4 | 5P/8 |
| 4 | ½ | .365 | .240 | ½ | ⅜ | 3/32 | .014 | 1/16 | | | 3/32 | .234 |
| 6 | ⅝ | .615 | .490 | ⅝ | ½ | ⅛ | .187 | ¼ | | | ⅛ | .312 |
| 8 | 1 | .865 | .740 | 1 | ⅝ | 5/32 | .234 | 5/16 | | | 5/32 | .390 |
| 10 | 1¼ | 1.115 | .990 | 1¼ | ¾ | 3/16 | .281 | ⅜ | | | 3/16 | .468 |
| 12 | 1½ | 1.365 | 1.240 | 1½ | 1 | ¼ | .375 | ½ | | | ¼ | .625 |
| 14 | 1¾ | 1.615 | 1.49 | 1¾ | 1¼ | 5/16 | .468 | ⅝ | | | 5/16 | .781 |
| 16 | 2 | 1.865 | 1.74 | 2 | 1½ | ⅜ | .562 | ¾ | | | ⅜ | .937 |
| 18 | 2¼ | 2.115 | 1.99 | 2¼ | 1⅝ | 7/16 | .656 | ⅞ | | | 7/16 | 1.093 |
| 20 | 2½ | 2.365 | 2.24 | 2½ | 2 | ½ | .750 | 1 | | | ½ | 1.350 |

P = Pitch of chain.
N = Width over all tension members.

# Prosperity Wave Hits Detroit Parts and Accessory Makers

## In Spite of Constantly Increasing Facilities and Working Forces, Manufacturers Are Striving Day and Night to Meet the Tide of Orders from Car Makers and Dealers

By L. V. Spencer

DETROIT, MICH., April 24—The same wave of prosperity that has deluged the car manufacturers here has reached the parts and accessory makers as well. Every one in this latter class who would talk about business conditions was so filled with optimism that the rather tight times of the past fall stood out in even more striking contrast than ever before.

It has been said that the automobile industry is enjoying remarkable prosperity, but most people take that to mean the manufacturers of automobiles, cars only; whereas these concerns' prosperity reflects immediately on the parts makers and on the producers of fittings, such as carbureters, magnetos, horns, etc., of necessity. It is a sort of reciprocal prosperity, for each class of makers depends upon the other.

Probably the parts and accessory makers are being pressed even harder than the automobile makers, for the former have demands from makers everywhere to meet, and a car maker can be more insistent than a dealer. The car maker has to pacify the dealers' demands for deliveries, whereas the parts maker must pacify the automobile manufacturer who is much nearer home and is harder to put off.

### Orders in Avalanches

Like the car builder, the parts man was hesitant last fall to build up a very large stock, for it was impossible to foresee just what the spring would bring in the way of business, and now he regrets this for orders have come with such a rush that it is almost impossible to take care of them. Some of the leading parts people are refusing to take orders now for June and July delivery, so far ahead are they sold, yet they hesitate to tell the customer for fear of losing his business.

### Work Day and Night

Day and night shifts are the rule in a great many of the plants, while at least one other is going still further and building large additions to an already immense plant. There is one very notable example of large parts orders for immedite delivery having to be turned away.

The Timken axle plant is manufacturing at a feverish pace to take care of orders. Business for May and June is characterized as being way out of sight, judging from present demands. Recently the Timken company took over the Metal Products Co. plant, and in this it is making the axles for Chalmers, Hudson and National, principally. In this factory as well as in the main plants there are 2,500 men. All are on full time, and in many departments there are day and night shifts. The Timken-David Brown Co., affiliated with the Timken-Detroit Axle Co., and maker of the worm axles of that name, is running day and night and has been for the past 3 months.

### Big Domestic Demand

In addition to the purchase of the Metal Products plant, Timken is adding some new factory buildings to the main plant. One of these is well under way, and will be used principally for the expansion of the David Brown worm gear department. It will give them at least double the present worm gear making capacity when the new machinery is all installed. Timken factories are working almost entirely on domestic business and the demand is stiff. Unless something unforeseen happens, there is every indication that this will be one of the busiest summers Timken ever had.

Property across the street from the present Timken plants is owned by the concern, and measures 1,000 by 500 feet approximately. It is the intention to start building this up at once. When completed these additions will house the power plant and the drop forging departments. The present forge shops will be removed entirely, and a four-story addition put in its place. As the forge is a one-story factory, the same ground will then have four times the floorspace. The contemplated additions when completed will more than double the present forge facilities. The additions involve $750,000.

### Continental—325 Daily

Continental motors are another much-sought Detroit product. The plant here is now turning out 175 a day and the Muskegon, Mich., factory is building 150 a day, these latter being mostly truck engines, although there is some passenger car work going on there. Detroit plant has 1,800 men and the Muskegon works employs 1,500. Continental business is 25 per cent better than at this time a year ago, and day and night shifts are the rule at both plants.

### Gemmer 20 Per Cent. Gain

At this time the Gemmer Mfg. Co., steering gear maker, has booked fully 20 per cent. more business now than last spring. The plant is running with its full quota of from 350 to 400 men, and the machine departments are operating night shifts as well. The output of complete steering gears, including the steering wheel, etc., varies from 360 to 400 a day, depending upon conditions. Unless there is an unforeseen drop, business will be exceedingly good with Gemmer, and there is no reason to look for any falling off, as there is plenty in sight.

### Busy Radiator Factory

The Long Mfg. Co., which makes radiators principally, is exceptionally well satisfied with conditions, and, in the words of one of the officials, the concern "feels very comfortable." The output approximates 175 radiators a day, and the aim is to make a radiator per day per man. As an indication of how this compares with other times, it might be said that at no time in its history has Long had over 250 men in its employ, showing that the present is well above the average. Long goes in for tractor and heavy truck work extensively, due to the peculiar adaptability of its type to that class of service. There are now

(*Continued on page* 782)

# European High-Efficiency Motors

## Part III

## Valves Are Timed Differently from Old Type Motors—Crankshaft Design Important—Effect of Offset Crankshaft—Lubrication Generally by Pump—Conclusions

By S. Gerster

THE camshaft must be calculated under bending, torsion being almost a negligible value. Fig. 15 shows the cam in the position of the greatest acceleration of the valve. The direction of the effort P is distant r from the center. In making calculations of a camshaft under flexure, it is only necessary to calculate by the sides of the cams working under the most disadvantageous conditions, for they only come into action one at a time. If the shaft is laid out as shown in Fig. 16, the moment of flexure can be established as follows:

$$P_1 = P \times \frac{a}{l}$$

The bending moment $M_f$ becomes

$$M_f = P_1 \times b = \frac{P \times a}{l} \times b$$

If W indicates the moment of resistance of the section R — R and s the tensile strength of the metal, we can obtain

$$s = \frac{M_f}{W}$$

= 5,700 to 7,000 pounds per square inch.

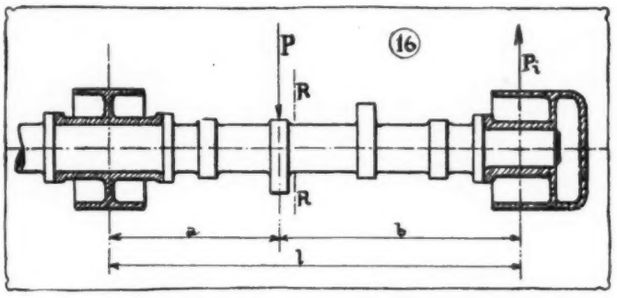



Fig. 16—Layout of camshaft for calculating moment of flexure

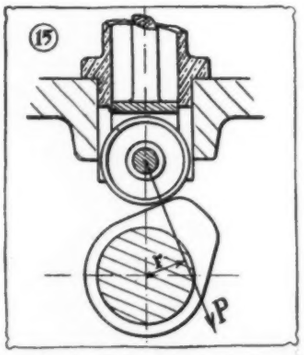
### Effect of Valve Timing

The timing of high-efficiency motors differs considerably from that of the old type. Exhaust valves are opened as much as 62 degrees before dead center, and they are kept open until 15 degrees after upper dead center, Fig. 17, in order to obtain a complete scavenging of the cylinder. For slower-speed motors this timing is not so satisfactory, and it is therefore advantageous to give only 52 degrees exhaust lead and 10 degrees lag to the closing, if the motor is not an extreme type.

The same difficulties are met with in the intake valves, a satisfactory timing for high speeds having disadvantages for slow running. Modern racing motors are timed according to Fig. 18, very often with 2 degrees lag in the opening of the intake and 30 degrees lag in the closing. At a certain moment, at the beginning of the aspiration, all the valves are open. When the motor has two intake pipes and two carbureters, each one connected up to a series of valves, it is advantageous to have a different timing. For the valves passing the charge at low speeds the timing of a slow-speed motor is given, Fig. 19, with 15 degrees lag to the intake so that the intake and the exhaust valves do not open together; for the high-speed valves the timing indicated above is used, as shown in Fig. 18. It is preferable to begin laying out the cam by a tangent to the primitive circle of the cam, taking care not to make the cam diameter too great.

The clearance i, between the pushrod and the valve stem, can be from 0.3 to 0.8 millimeter, or .0117 to .0312 inch. In order to obtain a silent motor this clearance, i, must be made as small as possible, but doing this increases the difficulties of machining and keeping the motor in tune. The angle of rotation $\alpha$ of the cam, which corresponds with the clearance i, can be expressed, Fig. 20, by

$$\cos \alpha = \frac{R + r}{R + r + i}$$



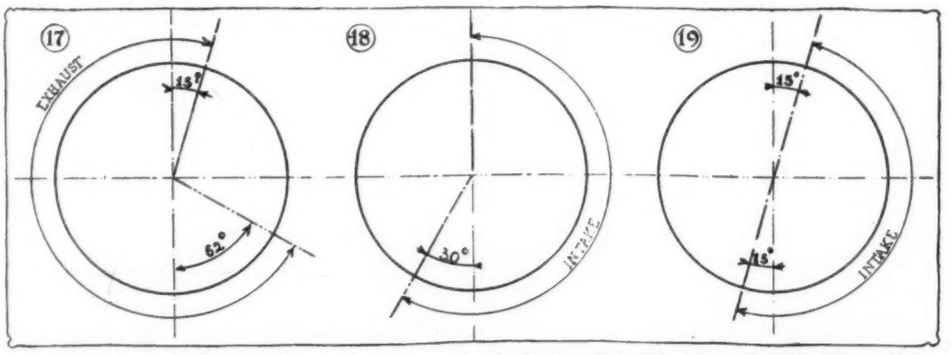




Fig. 15—Left—Cam in the position of greatest acceleration of the valve. Fig. 17—Left Center—Exhaust valves open 62 degrees before dead center and remain open until 15 degrees after upper dead center. Fig. 18—Right Center—Timing of modern racing motor with 2 degrees lag in intake opening and 30 degrees lag in the closing. Fig. 19—Timing of a slow-speed motor with 15 degrees intake lag

$\alpha$ is the angle of action of the cam corresponding to the duration of lift of the valve.

### Crankshaft Design

The crankshaft is often termed the heart of the motor, and is an organ which should receive the greatest attention. Unfortunately, engineers are to be met totally ignorant of the principles of the design of this organ. Firms with the highest reputation have had to revise their theories again and again, and one leading firm produced in 1913 an 85-millimeter, or 3.35-inch bore motor with a crankshaft of 42 millimeters, or 1.65 inches diameter, which broke after short use. It was replaced by a crankshaft of 48 millimeters, or 1.89 inches, diameter which also broke; finally a 52-millimeter, or 2.05-inch, shaft gave satisfaction. In these high-speed motors vibrations are set up which it is practically impossible to calculate, and manufacturers have merely had to adopt co-efficients which have been proved sufficient in practice. Formerly crankshafts and connecting-rods were designed on the assumption of a pressure of 550 pounds at the moment of explosion in the cylinder; but it was seen that this was insufficient, and at the present time 700 pounds is adopted, although diagrams do not indicate such a high pressure.

Let $P_x$ be the total pressure on the piston at the moment of explosion and $p_x$ the initial pressure in the combustion chamber,

$$P_x = S \times p_x = \frac{\pi \times D^2}{4} \times p_x$$

The majority of four-cylinder motors are now made with three main bearings, some with five, but a very few small high-efficiency motors have a two-bearing crankshaft. Ball bearing crankshafts are frequently found, although the wear of these bearings is somewhat rapid. The cause of this wear is the carbon deposited in the lubricating oil in the crank-chamber. In order to get really good results it is necessary to protect the ball bearings by means of felt washers from the oil within the base-chamber and to have a special oil feed which assures the bearings a constant supply of fresh and pure oil. This is the ideal arrangement, but for racing motors it is sufficient to put a washer before each bearing so as to protect it from the greatest projections of oil.

Calculations for this type of crankshaft are made according to Fig. 21.

$P_{x_1}$ and $P_{x_2}$ become:

$$P_{x_1} = \frac{P_x \times a}{c}$$

$$P_{x_2} = \frac{P_x \times b}{c}$$

The bending moment of the section X — X becomes

$$M_{x-x} = P_x \times b.$$

The moment of the section Y — Y becomes

$$M_{y-y} = P_x \times d$$

and the moment of the section Z — Z becomes

$$M_{z-z} = P_x \times e.$$

The section of the crankpin X — X is generally hollow, and the metal in these sections generally works at a pressure of

$$s = \frac{M_{x-x}}{W}$$

= 7,000 to 7,500 pounds per square inch.

If W is the moment of resistance, the steel employed is nickel steel with an elongation of 14 to 16 per cent. The center web A is calculated for a load of 7,000 to 7,500 pounds per square inch.

$$s = \frac{M_{y-y}}{W} = \frac{M_{y-y}}{\frac{b \times h^2}{6}}$$

The section is rectangular or as shown in Fig. 22.

The webs B are calculated in the same manner with s = 5,200 to 6,500 pounds per square inch.

About 3 years ago much higher values were accepted for touring car motors. Then the crankpin was under a pressure of 15,000, the web A, 10,400 to 13,000, and B, 5,700 to 7,000 pounds. The surface of the crankpin is calculated for the connecting-rod according to the explosion pressure. Thus, $p_f$ the pressure per square inch, we obtain

$$p_f = \frac{P_x}{F}$$

= 500 to 600 pounds per square inch

if F represents the surface of the crankpin, length multiplied by diameter. For the main crankshaft bearings we accept $p_f$ = 400 to 500 pounds per square inch. When ball bearings are used, it is possible to take bearings suitable for the load at 1,800 revolutions, instead of 3,500 and more.

There are certain cases, particularly two-cycle motors with piston pumps coupled to the main pistons, where the efforts of inertia have to be considered. In these cases it is necessary to ascertain the effort of inertia of the connecting-rod and the piston. In the two positions of the crank shown in Fig. 23 the effort of inertia acts on the crankpin and for the calculations we can consider the masses of the piston and the crankpin added to the center of the crankpin and af-

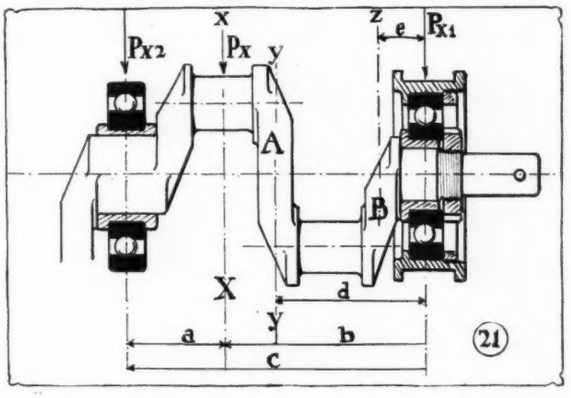



Fig. 21—Above—Ball bearing crankshaft with felt washers protecting the bearings from the greatest projections of oil

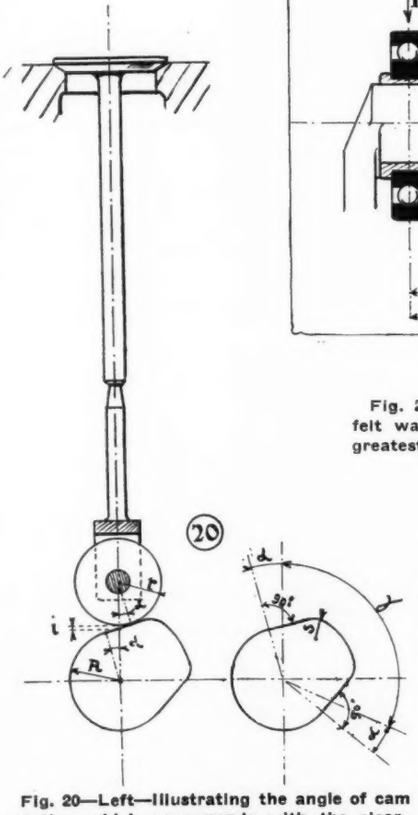



Fig. 20—Left—Illustrating the angle of cam rotation which corresponds with the clearance

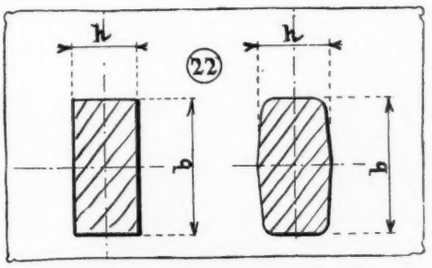



Fig. 22—Sections through crank webs calculated for loads of 5,200 to 7,500 pounds per square inch

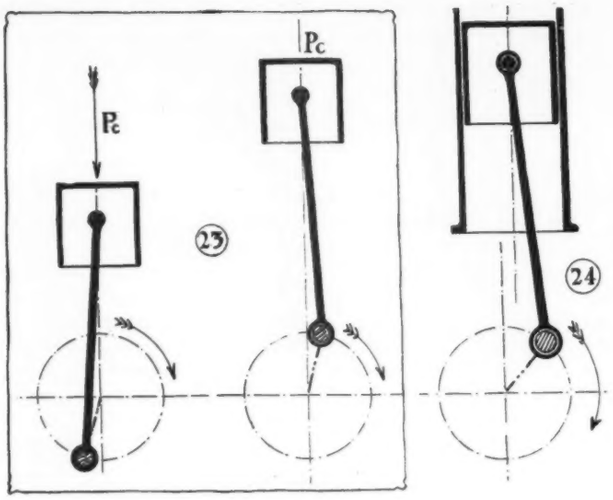



Fig. 23—In the two positions illustrated the effort of inertia acts on the crankpin. Fig. 24—Illustrating the crankshaft offset in relation to the axes of the cylinders. When the pistons are light it is desirable to offset as much as suitable for an equal distribution of the efforts at 2,500 r.p.m.

fected by centrifugal force. In this case $P_c$, the greatest effort becomes

$$P_c = \frac{M \times v^2}{R}$$

M being the mass of the piston and of the connecting-rod or their weight G divided by g we obtain

$$M = \frac{G}{g}$$

v being the circumferential speed of the crankpin, or

$$v = \frac{\pi \times 2R}{60} = \frac{\pi \times R}{30}$$

R being the radius of the crankpin. It may be found that the effort $P_c$ becomes greater than the effort $P_x$ of the explosion and if that is the case it is necessary to design the crankshaft with the effort $P_c$.

### Effect of Offset Crankshaft

The question of the offset of the center of the crankshaft in relation to the axis of the cylinders, Fig. 24, has its importance in this case. The lateral efforts on the cylinder walls are exercised regularly on the two opposite walls, except at the moment of explosion, when the efforts are balanced. $P_x$ acts downwards and $P_c$ upwards. In this particular case it is necessary to offset in the contrary direction, but only slightly and for very high speeds. But as the motor operates comparatively rarely at its highest speed, it is not necessary to offset if the pistons are relatively heavy. On the other hand, when the pistons are light it is advisable to offset as much as suitable for an equal distribution of the efforts at 2,500 revolutions. Either above or below satisfactory results are not obtained.

In modern motors the wristpin is preferably fixed in the connecting-rod and mobile in the piston, according to the general American practice. This gives a greater bearing surface and facilitates the lubrication. The following formulæ dealing with the wristpin have not changed to any great extent from those applied to the older types of motors.

The bending moment is considered as M, Fig. 25,

$$M = \frac{P_x}{2} \times \frac{L}{2}$$

and the tensile strength of the metal s, when W is the moment of resistance of the section.

$$s = \frac{M}{W} = 420 \text{ to } 560 \text{ pounds per square inch.}$$

For the lubrication we adopt a coefficient

$$p_f = 2{,}100 \text{ to } 2{,}400 \text{ pounds per square inch}$$

if F is the surface to be lubricated.

$$F = 2(d \times 1)$$

$$s = \frac{P_x}{F} = 2{,}100 \text{ to } 2{,}400 \text{ pounds per square inch.}$$

The connecting-rod should be made as light as possible, in order to reduce the mass of the moving parts. As to its length, it is advisable not to reduce to too great a degree the ratio length of rod to stroke of motor.

If L is the length of the connecting-rod from axis to axis and C the stroke of the motor we can adopt

$$L/C = 4/_1 \text{ to } 3.5/_1.$$

In ordinary construction we adopt

$$L/C = 4.2/_1 \text{ to } 4.5/_1.$$

### Stresses in Connecting-Rod

The connecting-rod has to be calculated under simple compression and bending by compression. Very often the connecting-rods are tubular with a cylindrical boring and the exterior slightly conical. The central section F — F has to be calculated. Under simple compression the calculation is as follows, F being the surface.

For the double T section:

$$F = (B \times H) + (b \times h)$$

$$s = \frac{P}{F} = 15{,}500 \text{ to } 17{,}500 \text{ pounds per square inch.}$$

This is calculated for racing motors, while for ordinary motors it is 13,000 to 15,000 pounds. For circular sections the same values are adopted. The margin of safety under bending by compression is calculated according to the example shown in Fig. 27 and the formula

$$M = \frac{\pi^2 \times E \times J}{P_x \times L^2}$$

M is the co-efficient of safety;
E the modulus of elasticity;
J the moment of inertia, axis B — B, Fig. 26;
$P_x$ the stress on the connecting-rod, and
L the length measured as shown in Fig. 26.

The co-efficient M is chosen between 3.5 and 4 for high-speed motors, while for ordinary construction it may be M = 4.2 to 5. The steels employed for the connecting-rods of high-efficiency motors have a tensile strength of 104,000 to 130,000 pounds per square inch and an elasticity of 12 to 14 per cent. They are completely machined, whereas milder steels are employed for ordinary motors and are generally stamped.

### Delivery of Oil Pump

Different methods of lubrication are adopted. The old type splash system has been abandoned completely. Generally, a pump is used, delivering the oil under pressure through the hollow crankshaft, or maintaining a constant level. For a motor having plain main bearings the most simple method is to lubricate under pressure, with a direct feed to each bearing; the crankshaft being bored, with an oil passage opposite each bearing; the flow of oil to the wristpins is a simple matter. For this good results can be obtained by a pump delivery of oil to troughs under each bearing. Delivery to the connecting-rod lower-ends is either by means of circular grooves at the side of the main bearings, or by means of dippers and a constant level trough under each rod.

The output of the oil pump for a high-efficiency, four-cylinder motor of 70 millimeters bore should be about 20 quarts per minute. For a motor of 100 millimeters bore the delivery should be 35 quarts. Older type motors which did not run beyond 1,700 r.p.m. had pumps delivering 6 to 10 quarts. The most commonly employed gear pumps have a delivery V in liters per minute.

$$V = M \times 2 \times N \times F \times h, \text{ when}$$

n = the number of revolutions above 500;
N = the number of teeth of each pinion, 8 to 12;
F = the surface of the hollow of one tooth, see Fig. 28;
h = the height of a tooth .75 to 1.5 inches.
The metric pitch is 2.5 to 3.5.

### Conclusions

This type of motor is almost invariably cooled by means of a water pump running at the motor speed. It is generally coupled up with the magneto, though sometimes placed on the opposite side.

Certain manufacturers have produced small, high-efficiency motors with thermo-syphon cooling; but the water pipes must be of considerable diameter and a great quantity of water must be carried round the cylinders. It may be considered that the maximum for thermo-syphon is a four-cylinder motor of 65 millimeters, or 2 1-2 inches bore for which $V_2 = 65$ quarts.

### Some High-Efficiency Sixes

With the exception of very small motors, the exhaust and intake manifolds are independent of the cylinder casting. For the intake this is necessary on account of the large diameter of the pipe, and for the exhaust on account of the excessive heat which would be retained. Very few high-efficiency motors have the intake manifold cast with the cylinders, even when the motor is of small dimensions.

Up to the present it is the four-cylinder motor which has given the best results as a high-efficiency type. From a motor with four cylinders of really very small diameter it is possible to obtain very high power. Nevertheless, a small number of manufacturers have produced high-efficiency, six-cylinder models. The main principles which govern the four-cylinders apply to the sixes, and where these principles have been understood thoroughly the difficulties which were met with in the early models have been avoided. In the design of the gas passages the only change is one of diameter.

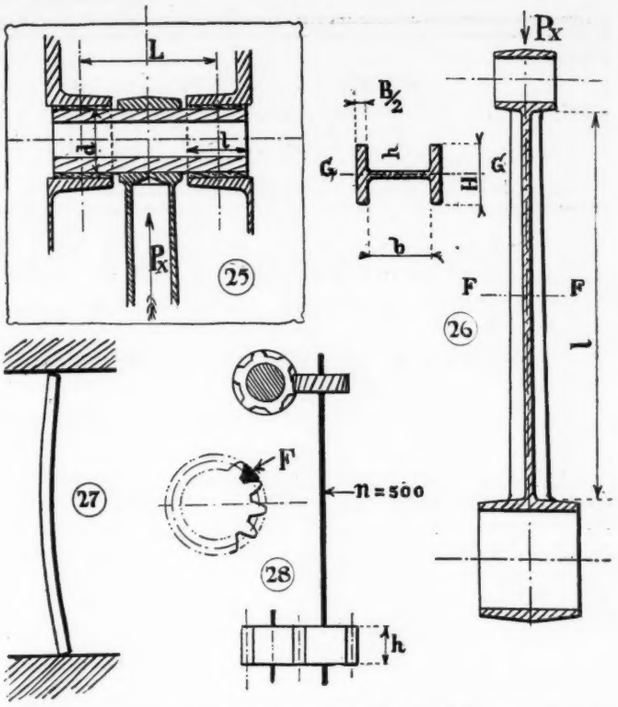



Fig. 25—Layout of wristpin for calculating bending moment. Fig. 26—How the connecting-rod is measured for calculating the margin of safety. Fig. 27—Diagrammatic illustration of principle followed in calculating margin of safety in connecting rod-bending under compression. Fig. 28—F is the surface of the hollow in one tooth of the gear used in an oil pump

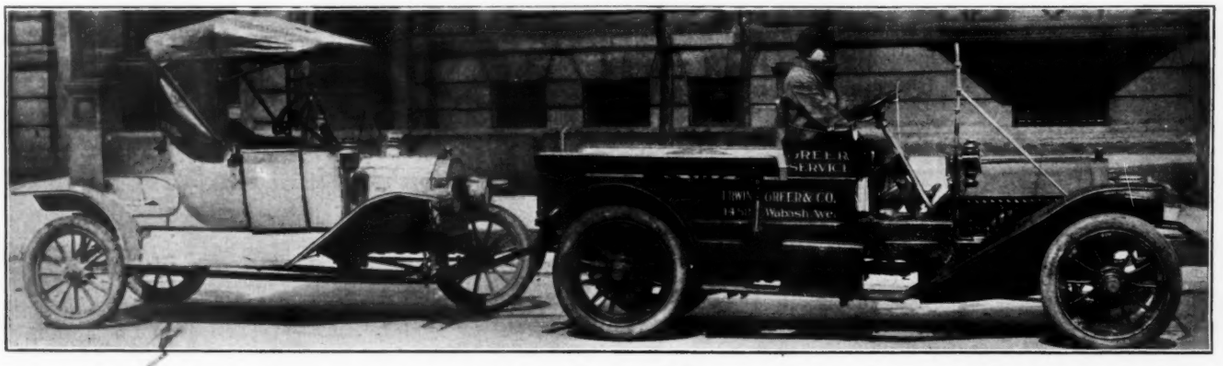
Both camshafts and crankshafts have to be strengthened for the high-efficiency six in the same proportion as for the high-efficiency four.

# A One-Man Ambulance for the Injured Car

A SIMPLE device for towing a disabled car which may be operated by one man, under all conditions and irrespective of which of the car's wheels may be affected, is in use by the Erwin Greer Automobile Co., Chicago, Ill. It consists of two lengths of T-section iron, 12 feet long, bent at an angle of about 10 degrees at a distance of 2 feet from one end. The other end of each length has hooks bent on it to enable it to engage either front or rear axle, as required. As long as there are two wheels on either end of the car to be towed, the device may be used.

The object of the bend is to allow the towed car to ride as near level as possible, while the ends of the T lengths may be anchored to the frame of the towing machine, as shown in the accompanying illustration. It is very simple to attach the device, which may be easily made.

If one of the rear wheels of a damaged car is useless, the T lengths are hooked over the rear axle and the car towed in backwards. In this case it is necessary to block the steering gear so that the wheels will not deviate from a straight course. When a front wheel is affected, blocking the steering gear is unnecessary as the device is designed to hold the wheel or wheels nearest it clear of the roadway, literally converting the towed machine into a two-wheeled cart, only the wheels farthest from the towing car touching the ground.



Illustrating the use of the one-man ambulance for towing a disabled car to the repair shop, as used by the Erwin Greer Automobile Co., Chicago, Ill., the front wheel of the towed car being lifted from the ground

# The Engineers' Forum

## Takes Exception to Lieut. Bryan's Recommendation of Low-Test, Easily-Vaporized Oil—Claims Such Oil Makes Mixture Over-Rich, Causing Loss of Power

By Chas. E. Duryea,
*Consulting Engineer.*

PHILADELPHIA, PA.—Editor THE AUTOMOBILE:—The article on oil by Lieutenant G. S. Bryan, in THE AUTOMOBILE for March 25, contains a lot of good meat but also some errors. What he says about the temperature of cylinder walls is probably true but, unfortunately, it is not possible to run an engine without a piston and it is the piston that gets hottest and its effect must be taken into account.

**Finding the Proper Oil Test**

It will need no argument to convince the reader that, except in some special shapes of engines, the center of the piston head is the hottest place in the motor. The cylinder head center, even if air-cooled, gets some cooling from the air but the piston head gets very little cooling from the gases confined in the crankcase. Its heat must pass to the piston walls and through the oil film to the cylinder walls. And it is the heat of the piston walls near its head that makes the trouble. How hot this is I do not know but I can tell how to find out the proper oil test required. Work the engine as hard as possible, as, for example, in hill climbing and then listen for pounding. Try adjusting the mixture and spark so as to be sure it is not due to pre-ignition. Having eliminated these possibilities, it may be accepted as certain that the piston runs onto a dry surface at the top of the stroke and this added friction is what causes the pounding. Now give the engine a shot of oil from a hand pump or feed a little into the intake pipe and see if the pounding stops. It most probably will. This proves that the trouble is lack of oil and that the oil is not of high enough fire test or there is not enough of it.

**Effects of Different Oils**

Next, compare the quantity needed to run the engine with full power and free from this pounding. In my run of 1,000 miles in 10 days accompanying the New York to Boston run of 1902, I took only 1 gallon of 800 fire test Duryaoyl with me besides having the cylinder cups and crankcase filled as usual. This gallon of oil carried my three-cylinder 4 1-2 by 4 1-2 engine from Reading, Pa., to New York City via Boston, 750 miles, with perfect lubrication although I had frequent altercations with the contestants as I passed them all twice daily. To get back to Reading, 150 miles, I had to buy 1 1-2 gallons of such oils as were to be found at the garages and then had to nurse the engine to prevent overheating and pounding. The last half-gallon secured at Philadelphia was Duryaoyl and the way we took the Pennsylvania hills after that proved the engine not pounding because of carbon but all right with proper oil. Tests like this are not hard to make. On the same run was Wally Owen with a Gasmobile of same bore and stroke and number of cylinders and he used more oil each day than I carried.

Another error is that the lubricating oil must vaporize if mixed with the fuel. This is impossible. The air passing through a carbureter is so nearly saturated with the vapor of gasoline that nothing heavier can be vaporized. And if vaporized the lubricating oil would never "condense on the walls" for the walls and cylinder are hot and tend to further vaporize. Just the reverse is necessary and the fact. The oil is dissolved in the gasoline and as the gasoline is sprayed each small globule of liquid carries its proportion of oil. The gasoline turns to vapor by losing from its outside until nothing but the oil is left in the tiniest globule imaginable. But it is oil just the same as ever and it oils everything with which it comes in contact. Compare some of this oil taken from the crankcase with some before mixing with the fuel and no difference is apparent.

**Results with Low-Test Oils**

Users who wish success with this mixture method of oiling should be particularly careful to get oil that does not vaporize at any temperature likely to be found in the crankcase or transfer passages because if a low-test oil is used it may get hot enough to vaporize and this would make the charge over-rich and make the engine miss and lose power. Reducing the amount of gasoline by readjusting the carbureter will, of course, help a little but a few misses permit the engine to cool down below the critical vaporizing point and then the carbureter must be opened once more.

**Argument for Two-Cycle, Air-Cooled Motor**

Many a perfectly good two-cycle motor has been blamed because the cheap low-test oil fed into its crankcase turned into vapor and interfered with its carbureter action. If the Lieutenant had fought his car for the biggest part of 24 hours, covering 75 miles and torn out, cleaned, and put back both the electric and gasoline systems before discovering that the trouble was with the oil, as I once did, he would be more careful how he advises people to select "an oil that has a low flash test and is easily vaporized."

I am pleased to see dissertations on oils. If users knew more about oils they would favor the high-heat, high-economy, air-cooled motor instead of bothering with the water-cooled type with its plumbing system and its blankets for winter use.—CHAS. E. DURYEA, Consulting Engineer.

## Favors Front Radiator in Peace—Dash Position for War

BUFFALO, N. Y.—Editor THE AUTOMOBILE:—The communications appearing in the Engineers' Forum for April 22 in defense of placing the radiator in front of the motor, answering Mr. Morrison's article in the Forum the week before advocating the dashboard position, seem to me particularly sensible. For example, Mr. Huff points out that, while radiator protection is a highly important consideration

in designing a car or motor truck for use in warfare, for ordinary conditions in our peaceful country there are comparatively few cases of punctured radiators due to the exposed position of the cooling reservoir. Also, in this connection, Mr. Younger brought out a very good point when he said that something must be placed in front of the car or truck to bear the brunt of a collision affecting this part of the vehicle, and, if only a thin sheet steel hood or bonnet is offered as resistance to the impact, the obstacle will be driven in on the motor, a much more important part and more difficult and expensive to repair.

**What About Heat in Summer?**

I have frequently endeavored to understand the mental attitude of the designer who placed the radiator at the dash, behind the motor, apparently with the idea of greater protection and improved appearance, but there are so many advantages in the favor of the front location that I have been utterly unable to do so. Mr. Morrison, for example, claims as an advantage of the dashboard position that in cold weather the heat from the radiator could be used to warm the front section of the car. I would like to know how much of an advantage the slight heat obtained in this manner would be when the driver thinks of the possibilities of a blistering hot day in summer with this little amateur furnace toasting his toes, for the almost imperceptible heat obtained in winter would be considerably multiplied in hot weather.

Mr. Morrison's contention that the location of the radiator behind the motor presents no great engineering or constructional difficulties is reasonable enough, but, by all means, why bother with it at all since the only real argument in its favor, from an engineering standpoint is that it permits of more perfect stream lines with a corresponding reduction in the wind resistance? As to the improvement in appearance with the use of a dashboard radiator and its resulting sloping hood, opinions are far too divided on this subject for me to even venture a conjecture as to the possible verdict of the public, which is, after all, the great deciding force in matters of this kind.

**Accessibility Greatest with Front Location**

As regards accessibility, it seems to me that everything is in favor of the front location, whereas with the dashboard type, the radiating surface must be larger, to compensate for its position behind the warm motor and away from the cooler air outside the hood, and repairs would be more difficult and expensive, to say nothing of the increased cost of manufacture.—R. E. BURROWS, M.E.

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# Recent Court Decisions—Words and Phrases

By George F. Kaiser

FROM time to time words and phrases come up in connection with the automobile trade, the meaning of which is important, but not generally known, as for instance—Fully Equipped, Unfair Competition, Restraint of Trade and Buildings Used Exclusively for Residence Purposes.

In a recent case decided in the Canadian Courts, it was held that Fully Equipped, as used in an automobile contract, could not be construed to bind the manufacturer of an automobile to furnish non-skid tires.

Suit arose on an automobile contract and the point was raised that as the car was to be delivered fully equipped, the buyer would not have to accept delivery if plain tread tires were furnished as part of the equipment.

The court decided, however, that an automobile might be fully equipped with plain tires in view of the fact that it was shown by parole evidence that, according to the usage of trade, plain tires, and not tires of a more expensive character, were meant by that expression.—*Halifax Automobile Co. vs. Redden*, 48 *N. S.* (*Nova Scotia*), 20.

**Restraint of Trade**

Whether or not there was a Restraint of Trade was the point in issue in another late case. An agreement had been made by one partner to sell out his interest in a hack line. He stipulated that he would not operate a competing line as long as the buyer continued in business.

The court decided that this agreement was not one in restraint of trade and when the seller started in business again in competition with the persons with whom he had made the contract, the latter were entitled to an injunction and damages.

The court said: "Contracts in partial restraint of trade are now generally upheld as valid when they are agreements by a seller of a business not to compete with the buyer in such a way as to decrease the value of a business; by a retiring partner not to compete with the firm; by a retiring partner not to do anything to hinder the business of the partnership; by an assistant or agent not to compete with his master or his employer after the expiration of his term of service; by the buyer of property not to use it in competition with the business retained by the seller, or an agreement made by the lesser of property not to use it in competition with the business of the lessee."—*Nickell vs. Johnson*, 172 *S. W.* (*Kentucky*).

**Buildings Exclusively for Residences**

The meaning of the words Buildings Used Exclusively for Residence Purposes in a city ordinance was recently determined by the highest court of Illinois.

A dealer applied for a writ of mandamus against the village of Oak Park to compel it to grant him a permit to build an automobile garage and salesroom. He was at first successful in his application, but the Supreme Court of Illinois on appeal reversed the case and held that he was not entitled to relief.

An Oak Park ordinance provided that "it shall not be lawful for any person or corporation to locate, build, construct or maintain in the village of Oak Park on any site where two-thirds of the buildings within a radius of 500 feet of the proposed site are *'used exclusively for residence purposes'* a building for a public automobile garage without the written consent of a majority of the property owners, according to frontage, within a radius of 500 feet of the proposed site of the building."

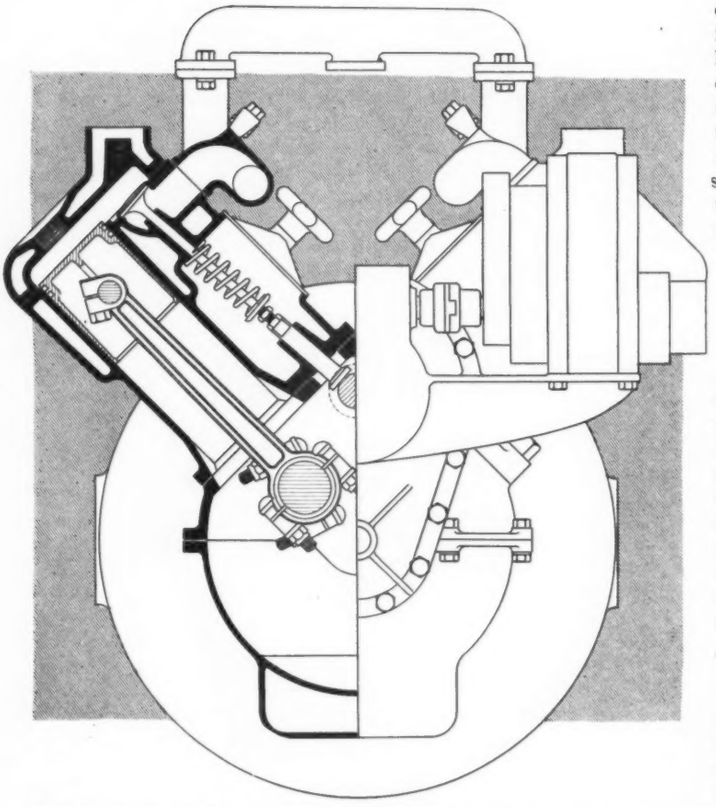
The dealer could not get the necessary number of consents and attacked the ordinance on the ground that it was void, unreasonable, arbitrary, unnecessary and prohibitive.

There were thirty-eight buildings used for residence purposes, eight business buildings, one public garage, one church, three private barns and twelve private garages within the 500 feet radius.

The Supreme Court said that in construing the words Buildings Used Exclusively for Residence Purposes, the private garages used in connection with the residences would not prevent the residence buildings from being counted as exclusive residences and that therefore two-thirds of the buildings within the radius would have to be counted as residential buildings. As the ordinance was held reasonable and valid, decision was rendered in favor of the village.—*Keller vs. Village of Oak Park*, 107 *N. E.* (*Illinois*), 636.

# Herrmann Eight Uses Splash Oiling

## Two Berling Magnetos Set at 90 Degrees Furnish Ignition—Other Types Easily Fitted—Thermo-Syphon Cooling—Cylinders Are Offset—Valves Set at an Angle



Part section through eight-cylinder Herrmann motor, showing accessibility of valves

THE HERRMANN ENGINEERING CO., Detroit, Mich., has placed before the public an eight-cylinder motor of moderate size which develops 35 horsepower at 2,000 r.p.m. It has a bore of 2 1-2 inches and the stroke is 4 inches, giving a ratio of 1.6, and a piston displacement of 156.7 cubic inches. Two magnetos are used and lubrication is by splash. Cooling is by thermo-syphon.

### Cylinders Are Offset

The new member of the eight-cylinder clan has several noteworthy features, but it adheres in the main to generally-accepted good practice. The cylinders are cast in blocks of four and arranged in the usual V form, but they are offset sufficiently to allow the connecting-rods to be placed side by side in pairs on each crank bearing. The cylinder heads are removable, and the crankcase is made entirely of aluminum with no part of it integral with the cylinders. Split horizontally into two sections, it conforms very closely to average practice.

The single camshaft, carried directly above the crankshaft on two bearings, has sixteen integral cams, which bear directly upon the valve tappets. To make this possible, the valves are positioned at a slight angle to the centerline of the cylinders which they serve, thus bringing the lower ends further from the cylinders than the valve heads and allowing a straight upward thrust on the valves from the cams. This construction therefore does away with any intervening rockers between cams and tappets, and at the same time the valve heads are close to the cylinders, requiring no larger valve pockets than would be necessary if they were straight-acting valves. Of course, the valves might still be made to act from the camshaft direct by locating them parallel to the centerline of the cylinders but further out. This, however, would lengthen the valve pockets, increase the amount of metal and consequently increase the weight of the engine. There would also be less room in the V between the two sets of cylinders.

These valves seat at a slight angle to the horizontal, but this, as well as the drilling at the angle are simple machine jobs. The valves have an overall diameter of 1 1-4 inches and a clear opening of 1 1-8-inches, and the springs and adjusting nuts are readily reached through the plates in the V. This method of actuating the valves is unquestionably the simplest that could be devised, and the attendant reduction of moving parts with the incidental lost motion, however slight, connected with same, is a commendable feature, especially for a small motor of this kind.

### Two Magnetos Used

The Herrmann engine is probably one of the first to use magneto ignition and the sparking function is provided for by two Berling magnetos, one at either end of a cross shaft at the front of the engine. The drive for this shaft is at its center by a spiral gear connection with the camshaft gear. This makes a very symmetrical construction, and each magneto serves its own set of four cylinders, it being possible to drive them at engine speed in such a system. It is only necessary to set them at 90 degrees to each other when the action of each is the same as for a four-cylinder engine. But, should the customer not desire this kind of ignition, the Herrmann concern points out that since the bracket carrying the two magnetos and their drive is mounted on the gear cover, it can be removed without disturbing the engine construction, and whatever type of ignition required fitted in its stead. This allows a very flexible design.

The timing gears themselves are spirally cut and completely housed at the front.

### Thermo-Syphon Cooling

Cooling is by thermo-syphon, which finds its most efficient use in the eight-cylinder engine due to the peculiarities of design which lend themselves most successfully to the free flow of the cooling water. In this respect, the Herrmann engine seems very well designed, for the water spaces are unusually large for a small engine, providing good jacketing of the valve pockets and upper part of the valve stems. The water outlets connect to the inner upper edge of the cylinders, which point is the highest in the cylinders.

The Detroit concern is among the first to employ splash

oiling for an eight, and in this design claims to take care of the lubrication problem simply and effectively. There is a plunger pump feeding oil from the oil base to the connecting-rod troughs, and from these it is sent up into the cylinders and to the main bearings by splash. This system is claimed by the maker to work out very satisfactorily in practice.

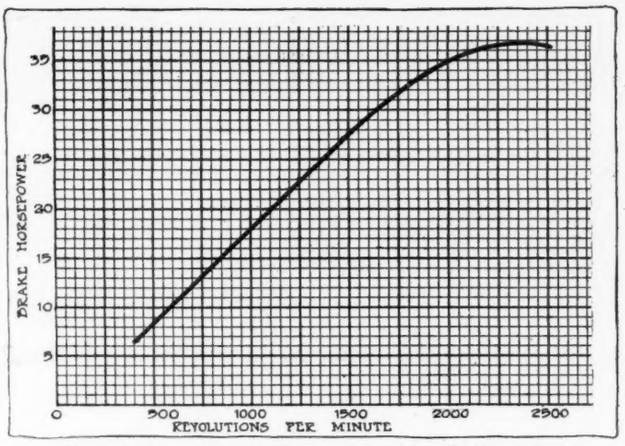
**Single Carbureter Employed**

The intake manifolding is arranged in bridge fashion. That is the design calls for a single carbureter with a vertical outlet, which is hung below the cross manifold that connects to each set of cylinders.

The engine is furnished with or without a bell housing to take a gearset, and when the unit power-plant feature is required, the housing can be cut out wherever the customer desires to put the motor-generator, providing electric cranking and lighting are to be fitted.

Following are the important dimensions, supplementing those already given:

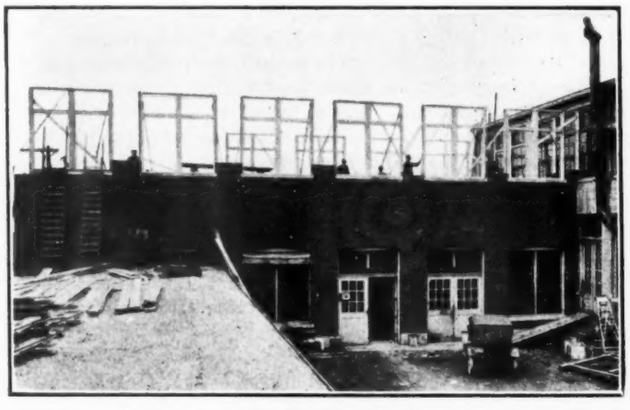
Crankshaft bearings—
Front—1½ inch diameter by 3¾ inches length.
Rear—1½ inch diameter by 3¼ inches length.
Connecting-rod bearings—
1½ inch diameter by 1⅝ inch long (two per crank).
Camshaft bearings—
Front—1½ inch diameter by 2½ inches length.
Rear—15/16 inch diameter by 2 9/16 inches length.
Length from front of magneto to end of cylinders (hood length)—23 in.
Overall height—19 inches.
Overall width—19 inches.




Horsepower curve of Herrmann eight-cylinder motor

The accompanying illustrations show the motor in section and also the horsepower curve, which as already stated, indicates that the motor develops 35 horsepower on the block at a speed of 2,000 revolutions per minute. The motor section shows the bridge type of manifold used with the vertical connection for the single carbureter. It also illustrates the accessibility of the valves through the cover plates.

# New Engineering Building for Schebler Plant



Engineering building now in course of construction as an addition to the plant of Wheeler & Schebler, Indianapolis, Ind.


Lancia car which is now on its way to San Francisco on a transcontinental test of Dreadnaught tires. Three extra shoes are carried. Note tackle on fender for rough road work and special cross-country type of body

INDIANAPOLIS, IND., April 24—Wheeler & Schebler, makers of the Schebler carbureter, have under construction a two-story, 30 by 70-foot addition to their plant which will be used for engineering purposes. The structure will increase the floorspace of the factory, which is already over 300,000 square feet, by about 4,200 square feet and will contain the engineering offices, drafting room, laboratory, experimental machine and pattern shops on the second floor. The first floor will be the testing laboratory, refrigerating plant, test car and experimental car garage. About eighteen men will be employed in the building, which will soon be completed.

## Start Transcontinental Test for Dreadnaught Tires

BALTIMORE, MD., April 24—The Dreadnaught Tire & Rubber Co., this city, has started a Lancia car equipped with its tires on a 10,000-mile run from New York City to San Francisco. Before leaving New York, the tires were inspected and marked by a committee which will re-examine them on the return of the car from its journey and then make a report.

The interior of the car is arranged a la Pullman sleeper, the berth being suspended from the roof, though leaving sufficient room above for the long rack on which the lighter luggage is carried. No tent is required, the tailboard being very long and, when dropped outward, is completely covered by a single curtain, keeping the interior snug and dry. The company guarantees its tires for 7,500 miles and expects that the run will be completed on the original casings. D. LaPorte is in charge of the test and Harry Goss acts as pilot.

As may be seen in the accompanying illustration, the outside of the car is fairly covered with the advertisements of the manufacturers whose equipment and supplies are used on the run.

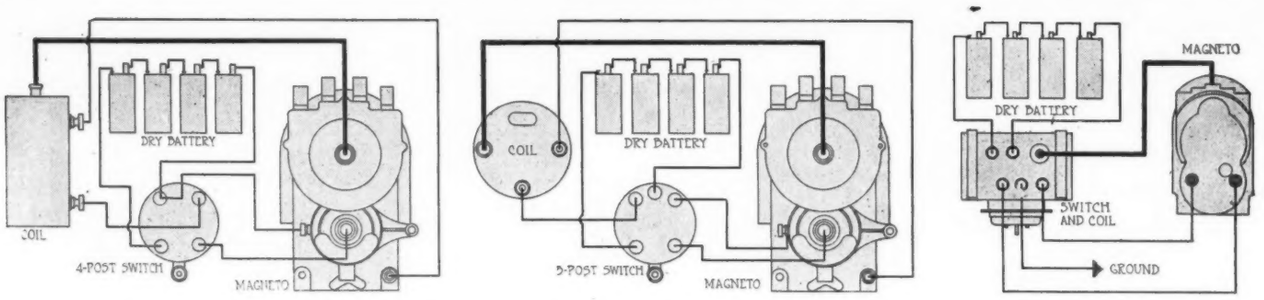



Fig. 1—Wiring diagram showing complete layout of electrical equipment on Little four

# The Rostrum

## Wants Information on 1910 Thomas

EDITOR THE AUTOMOBILE:—I have a 1910 Model M Thomas car, six-cylinder, and with a bore of 4.25 and a stroke of 4.5. What is the proper oil level in the crankcase and oil chamber?

2—How do you put the oil in the crankcase?

I have had trouble with the oil leaking out of the coupling between the gearset and the clutch and I plugged the hole in the shaft from the gearset and thus stopping the flow of oil. Will I experience any trouble by doing this?

3—How long should a magneto run without overhauling and what is to be done to keep a magneto in first class condition?

4—What is the average life of a spark plug?

5—I am using a Stromberg carbureter and when I throttle it down the engine stops; when it is speeded up to 20 miles per hour, it skips and backfires through the carbureter. How can I remedy this?

I find on climbing hills, the engine slows down and does not show the power expected, although the compression is very good.

6—What is the gear reduction and what speed should it show when in good mechanical condition?

7—What is the best oil to use on the engine?

8—Is the idea of putting an old shoe over a new one and sewing both together feasible? Does it take more power to drive a car so equipped?

Lynn, Mass. F. J. HADDEN.

—You should put 7 pints of oil in the crankcase between the front breathing tube on the left side of the motor and the rear breathing tube on the same side. The oil is placed in both these tubes above the left side of the motor, toward the motor front leg and left side of motor rear leg. The top is a funnel shaped tube with a screen cap. It can be removed by pulling it directly off.

2—This is answered under question 1 partly. When the oil leaks the trouble is that the packing either at the front or rear end of the main driveshaft is worn out. The packing is worn out of the ring thus causing the leak. Remove the coupling, take off the packing nut and repack with gerlock or candle wicking. If oil flows from the crankshaft into the clutch, plug this by driving a piece of pine wood in as a wedge. This will do no harm.

3—A magneto will run through an indefinite period of years without overhauling. There are many which have been in use more than 5 years without having received practically any attention beyond an occasional drop of oil. To keep a magneto in first class condition it should be oiled in accordance with the maker's directions and kept scrupulously clean.

4—The average life of a spark plug is also an indefinite quantity but 2 years may be said to be a conservative estimate.

5—From what you state it is evident that either the gasoline line is clogged, is too small in diameter, or bent at some point so that a sufficient flow of gasoline is not obtained to give the carbureter the amount necessary to supply the motor when speeding at above 20 miles per hour.

It may also be possible that the float mechanism has become disarranged in some way so that the level is not up to the correct height. This would also cause the motor to stop when throttled down, due to the fact that since the gasoline level is not up to the correct height the suction is not sufficient to lift the gasoline from this lower level and the motor would naturally stop for lack of gas.

6—The gear ratio might be either 3.25 to 1; 3.5 to 1 or 3.75 to 1. You can determine this by putting a chalk mark on the fly wheel, jack up one side of the car, put a chalk mark on the tire and make one complete revolution of the motor. The revolutions of the rear wheel should then be counted and divided by two since the action of the differential will multiply the throttle of the wheel. When in good mechanical condition this car is capable of between 55 and 60 miles per hour.

7—The best oil to use is a light vacuum grade.

8—While it would not be advisable to put an old shoe over a new one and sew both together, it is a very good scheme to sew two old ones together. While a certain percentage of more power is required to operate the car with this equipment than with a single tire, it will no doubt result in a direct saving where the two shoes are used.

### Removing Wheel from Floating Axle

Editor THE AUTOMOBILE:—I am the owner of a 1914 Moon five-passenger touring car. The right hand rear brake drum is leaking grease which has worked its way from the differential casing.

Will you please let me know through the Rostrum how the

rear wheel is taken off the axle housing, the same being a floating type?

I succeeded in withdrawing the axle, but do not understand how the wheel should be removed.

New Orleans, La. J. E. SCHENCK.

—The six nuts on the live axle flange which bolts to the wheel should be removed and then the live axle pulled out. There are two nuts on the end of the axle tubing, one of which is a locknut. These should be removed and the wheels can then be pulled off. There are annular bearings in the wheel and they come off with it.

## Timing When Flywheel Is Unmarked

Editor THE AUTOMOBILE:—Would you please advise me in your next issue the valve timing of a Buick model 16, as the flywheel is not marked?

2—Can you advise me of some way to test a coil which is used on a Buick model 16?

Defiance, O. J. C. HANNA.

—The valves can be timed as follows: Adjust the pushrods and rocker arms to obtain the clearance of .015-inch between the end of the rocker arm and the valve stem, with the valve lifter roller on the back of the cam. Then, set the camshaft to close the exhaust valve when the piston is 1-16-inch past the upper dead center and to open the inlet valve when the piston is 3-32-inch past upper dead center.

2—Two different coils are used on the model 16 Buick, the Remy and the Splitdorf. There is no positive way to test these coils except to see that the primary circuit is all right when the vibrator works, and that the secondary is all right by obtaining a good spark on short-circuiting the coil.

## Wiring Diagram of Little Four

Editor THE AUTOMOBILE:—Will you please draw a sketch for me of the wiring on the Little car, making sure to note where the different colored wires go on the magneto?

Winona, Minn. A. READER.

—The wiring of the Little car is shown in Fig. 1. This is a complete diagram and will show where all the connections are made.

## Adjustment of Type B Stromberg

Editor THE AUTOMOBILE:—Please give all adjustments for Model B-3 Stromberg carbureter.

2—What would you advise to use to clean out a radiator that seems to be full of flaky rust?

3—Can I use a 33 by 4 tire on a 32 by 3½ clincher rim? If not, what can I use that is bigger than 32 by 3½?

Scranton, Pa. R. P. H.

—The type B carbureter is a concentric type having a spray nozzle PN mounted in the center of the carbureter, and in the center of the float chamber, with its point 3-16 of an inch above the normal gasoline level and surrounded by a modified venturi tube. This nozzle is proportionate in size to the carbureter and never needs attention or adjusting.

After the carbureter is installed and the gasoline turned on, note the level of the gasoline in the float chamber. It should be about 15-16 of an inch from the lower edge of the glass marked X. This level is adjusted at the factory and should be right. In case it is obviously wrong remove the dust cap D and turn the adjusting screw S until the proper level is obtained. If the gasoline is too high, screw the nut down. If gasoline is too low, screw the nut up. Do not change unless absolutely necessary.

To start the motor, close the valve S3 in the hot air horn H. The motor should then start on the second or third turn of the crank; if not, open the valve and it ought to start on the next turn. Great care should be taken to see that this valve is instantly opened as the motor starts and is kept so.

Turn up the adjusting nut A until the spring S1, which is the low speed spring, seats the valve lightly. See that the high-speed spring above B is free and does not come into contact with the nut on top of the auxiliary air valve stem. Start the motor and turn nut A up or down until motor idles properly. This is the low speed adjustment.

Advance the spark and open the throttle. If the motor backfires through the carbureter, turn high speed adjusting nut B up until backfiring ceases. If with this adjustment and running at low speeds motor gallops, or the carbureter loads up, the mixture is too rich. The nut B should then be turned down until galloping or loading up ceases. This is the high-speed adjustment. The spring above nut B should always have at least 1-32 inch clearance between it and the nut at the top when the motor is at rest.

If after adjusting the nut A until the mixture on slow speed is correct you find that the valve is off the seat while the motor is at rest, it indicates that the nozzle is too large. If you find that nut B has to be turned up so far that the high speed spring is in contact with the small nut on top of the air valve stem when the motor is at rest, in order to get proper mixture on high speed, the nozzle is too small. To remove the nozzle take out drain cock DC in the bottom of the carbureter and then use a regular screw-driver. Nozzles are numbered, according to drill gauge sizes. For instance: Number 59 nozzle is larger than number 60.

2—Strong solution of washing soda and water.

3—Yes.

## Graphite Grease Is Good Spring Lubricant

Editor THE AUTOMOBILE:—I have just read the article in THE AUTOMOBILE for March 25 describing the new Maxwell racing cars and would like to have this explained. You state that the cars used no differential gears. How do they get the different speeds on the rear wheels?

2—What type of differential do they use?

3—I drive a 1912 model 38 Buick and there is a slight squeak in the front springs. Some mechanics advise using a graphite grease between the leaves while others say not to, as it will cause the leaves to spread or slip. This does not seem possible as I understand that there is a center pin.

Berkeley, Cal. P. J. SAUNDERS.

—The cars do not use any differential mechanism whatever and hence no compensation for different speeds is made on the two rear wheels.

2—This is answered above.

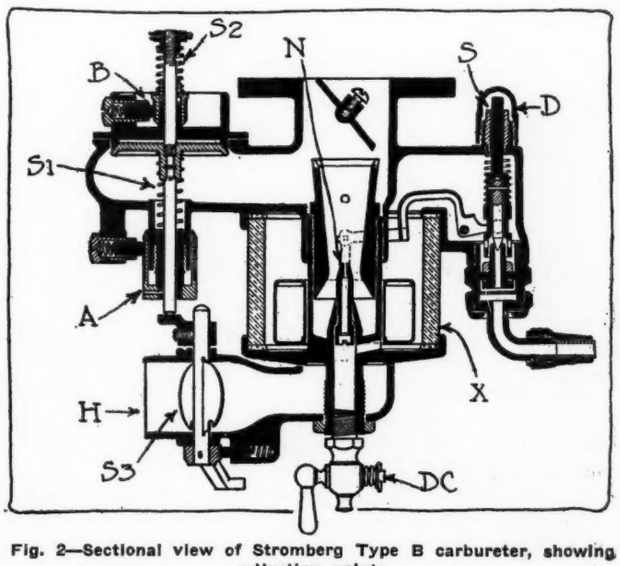



Fig. 2—Sectional view of Stromberg Type B carbureter, showing adjusting points

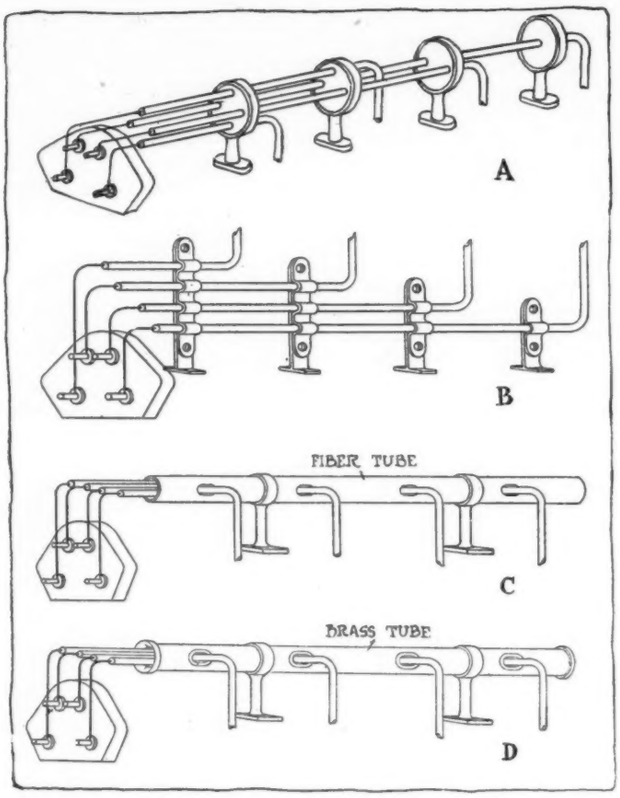



Fig. 3—A—Method by which the wires can be separated from one another to avoid static effects. B—Another method of separating wires to avoid static effects. C—With this arrangement static effects are sometimes felt. D—Running wires through brass tubing does not avoid static effects

3—The use of graphite grease between the leaves of the spring is very effective in preventing squeaks and there can be no possible objection to its use for this purpose. It is intended that the leaves of the spring slip freely over one another.

## Home-Made Acetylene Welding Torch Fails

Editor THE AUTOMOBILE:—Can you give me the requirements for becoming a member of the Society of Automobile Engineers?

2—What is the cause of an acetylene welding torch flashing back continually? I made the torch myself. The lead is first quality. No. 1 bronze and tips are made from soft brass rod. It worked finely for a while, then began to flash the moment the work was hot enough to weld. All my tips act the same. Can you tell me if there is any metal I can use for tips that will not flash back? How are the torches made that do not flash?

Somerville, Mass. J. T. F.

—The requirements for becoming a member of the Society of Automobile Engineers are exactly parallel to those for entering any other engineering bodies, that is, you must satisfy a committee that you are familiar enough with the art to be able to represent the standing of the body of members. You should address the secretary of the Society of Automobile Engineers, 1790 Broadway, New York City, who will furnish you with an application blank for membership, together with information regarding the different grades of membership in the Society.

2—The fact that you have made the torch yourself renders it remarkable that you have had at least some degree of success. The difficulties that have attended the invention of a suitable torch for oxy-acetylene welding are almost proverbial and it is only within very recent time that any success has been had. The first torch was invented by Edmund Fouché which was a high pressure type and some time afterwards the same man invented a low-pressure type torch. The nozzles of all torches suffer from the intense heat, but the direct cause of backfiring is generally due to holding the torch too close to the work which begins to radiate heat and then fires the gas. The heating effect of backfiring has lately been overcome by the use of water-cooled torches.

## Static Electricity in High-Tension Systems

Editor THE AUTOMOBILE:—Will you kindly let me know a way to re-harden permanent magnets that have been through fire?

2—How wide a gap will a 3-8-inch spark in the open air jump under the compression of the modern automobile motor? A 3-16-inch spark?

3—Does static electricity ever interfere, to any extent, in high tension ignition systems? If so, how?

4—How can a condenser be tested with ordinary measuring instruments?

5—Does the new Splitdorf-Apple motor generator have two different windings on the armature? If not, how does it take care of the large current in cranking the motor without burning out?

San Francisco, Cal. A. S.

—Hardening of magnets is a most particular operation and is done by a score of mechanics who do nothing else. It is work that involves the qualifications of an expert and hence it is impossible to give hard and fast instructions regarding this matter. It would be much cheaper in the long run to obtain a new set of magnets from the maker.

2—A spark which will jump 3-8 inch in open air at any and all speeds, will work at approximately 1-32 inch under compression. A 3-16-inch spark will work at 1-64-inch under compression, under certain conditions. A spark of the size mentioned would work under a great deal larger gap, but, for reliability and to obtain the greatest value from the spark, the figures given are most advisable to use.

3—Static electricity interferes to a great extent in high-tension ignition systems if provisions are not made for taking care of same. The precautions necessary to take consist of correctly placing the high-tension wires that run from the magneto distributer to the plugs. Illustrations showing the various arrangements which can be made are given in Fig. 3.

4—A condenser can be tested by ordinary measuring instruments. The amount of charge it will take and the discharge it will give can be measured most directly by means of a galvanometer.

5—The new Splitdorf-Apple motor generator has only one winding on the armature. This winding is of sufficient size and of sufficient conductivity to safely handle the starting current delivered by the storage battery.

## Firing Time of 45-Degree Eight

Editor THE AUTOMOBILE:—I will be obliged for information regarding how H. C. Chatain fires his eight-cylinder engine; two blocks of four cylinders set at 45 degrees to each other and having two outer crank pins, with crankshaft at 180 degrees with the two minor ones. I can only see the cylinders fired 45 degrees after the other and then 135 degrees, 45 degrees and again 135 degrees which makes one revolution.

If that is the case, could the engine run without vibration when the explosions are so unequally distributed?

Chicago, Ill. J. B.

—One cylinder fires 45 degrees, the sequence of firing being 45 degrees, 135 degrees, 45 degrees then 135 degrees and so on as per your understanding. If you will carefully read the

paper you will note that the vibration set up by the mass of the moving parts is completely explained for an engine of 90 degrees, also for one of 45 degrees. In regard to the torque reaction, the 45-degree engine is obviously not as good as the 90-degree engine. To describe the action of the engine in an ambiguous way, so-called smoothness of operation of a 45-degree engine will be better than the ordinary four-cylinder design but not so good as the 90-degree engine. Special conditions due to its application are largely reasons responsible for the adoption of this design, and therefore you should consider your problem as separate and not necessarily draw conclusions from Mr. Chatain's engine, although it is doing its particular work satisfactorily.

### Better to Fit New Camshaft

Editor THE AUTOMOBILE:—I have a Buick model 32 and am going to have the cylinders reground, new pistons and rings fitted and would like to know if I could increase the power and speed of this motor by shortening the outer end of the rocker arms thus making the valve have a wider opening. If so, please tell me how much to shorten it. Would it help any to advance the camshaft a notch or so ahead?

Rochester, Ind. WALTER ROSS.

—You would not secure satisfactory results by attempting to do this, but if you desire to change your firing and the characteristics of your motor it would be better for you to fit an entirely new camshaft.

### Pumpshaft Too Light for Starter Mounting

Editor THE AUTOMOBILE:—Could a single unit starting and lighting system be used on a model 38 Buick and connected on the shaft driving the present pump and magneto; by using the shaft to start the motor, instead of the flywheel, or is this not practical?

2—What is the maximum speed of this motor as to miles per hour, also r.p.m. in a runabout model?

3—About what would be the cost of installing self-starter on this model? At present the car is equipped with a Vesta lighting system and a 6-80 Vesta battery.

Phillipsburgh, N. J. G. H. Z.

—A single unit starting and lighting motor generator could not be applied to the pump shaft of the model 38 Buick because the shaft and its bearings are not sufficiently heavy to take the torque necessary in cranking this motor. The compression is quite high and a considerable strain would be imparted to the bearing surfaces and the shaft itself in the momentary high-torque condition necessary in obtaining the initial cranking moment.

2—The maximum speed of the motor is about 2,600 r.p.m. The maximum power, however, is developed at 1,900 r.p.m. and at a gear ratio of 3.5 to 1 which is generally used on direct on these cars in connection with 34-inch wheels, the speed would be equal to 55 miles per hour, approximately.

3—It would be impossible to give an exact figure on the cost of installing a starter on this model as we have no record of any installations and the cost would greatly depend on the device chosen and the manner in which it is installed.

### Front Wheel Drive Lessens Skid

Editor THE AUTOMOBILE:—Driving the front wheels does undoubtedly lessen the tendency to skid as W. H. P. suggests in The Rostrum for April 8, but as you point out it is hardly a practical remedy. There is a better way. First, what causes it? Try pushing a load on a slippery floor and note your feet slip badly. Put that load on your shoulder and note the slightness of any tendency of your feet to slip. This is all there is to it. Carry the weight on the drivers instead of requiring them to push it and skidding practically vanishes. This has been proven for the last 15 years by vehicles having most of the weight on the drivers. It is the eventual answer. And instead of driving the front wheels which carry the heavy motor and too much of the weight, the future construction will put the motor at the rear where the work is to be done. Then we will hear less about skidding.

Philadelphia, Pa. CHAS. E. DURYEA.

### Motor Will Not Throttle Down

Editor THE AUTOMOBILE:—I have a car which has given me no end of trouble. It all seems to be in the motor. This motor will not throttle down below 15 or 20 miles per hour and this is very annoying as I cannot stop with the motor running without it sounding as though it was coming out of the car. I recently had the magneto changed but I still have to run on batteries, the magneto firing very irregularly.

If this motor could be throttled down and the motor be made to run on the magneto, I would be very thankful for any information from you.

Immediately on closing the throttle the motor stops, all this while on the battery.

Goldsboro, N. C. R. M. PETTWAY.

—The probable cause of this trouble is that you are not securing a rich enough mixture at low speeds. If you will change the needle valve adjustment on the carbureter which will provide a rich mixture and then if necessary cut down on the air supply the motor should run at low speed. Another possible cause of this trouble is that the spark plug points are so far apart that you do not get a good spark until the motor has speeded up to such a degree that a high current is generated. Possibly another solution to the problem would be that you have an air leak somewhere in the intake line which permits too lean a mixture at low speed. Go over all joints in the intake line very carefully and see that there are no leaks there. A hissing sound when the throttle is opened suddenly is an indication of an air leak in the intake.

### Wants Details of Timken Jackshaft

Editor THE AUTOMOBILE:—Can you give me any detailed description of the Brown-Lipe gearbox, such as is used in connection with the Timken jackshaft on the 1914 model Modern truck 1,500-pound capacity, as for adjustments?

Eureka, Cal. A. R. CARRICO.

—A detailed drawing of the Brown-Lipe gearbox such as that used in connection with the Timken jackshaft on the 1914 Modern truck is given herewith. This is the model 50 jackshaft transmission of the Brown-Lipe gear company and is furnished especially to both in a unit with the Timken Detroit Axle Co. jackshaft. The detail is given in Fig. 4.

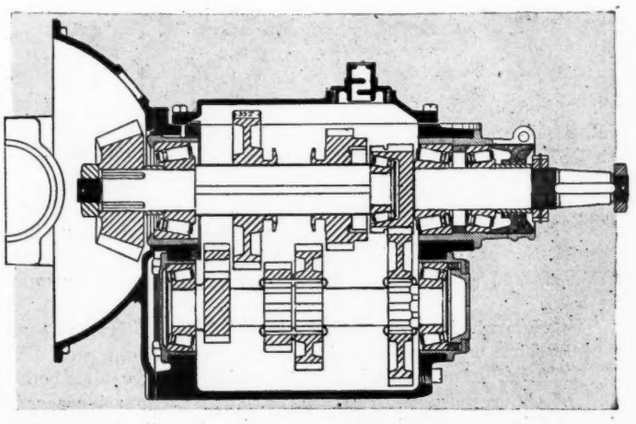


Fig. 4—View of Brown-Lipe gearbox as used in connection with Timken jackshaft

# Outline of a System for Standardizing the Combination of Spring Elements Required for Motor Vehicles

## (The Improvement of Spring Systems—XII)

By M. C. K.

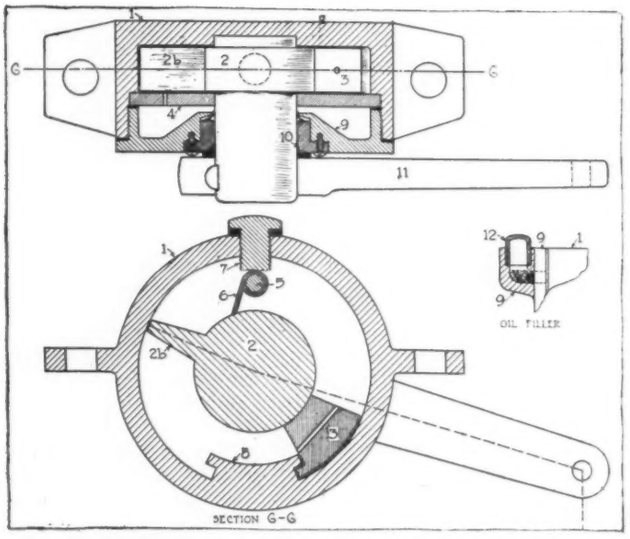



Fig. 7—Type of rebound check whose action is uninfluenced by load changes. With independent adjustment for regulating oscillation period. Similar action needed for all vehicle springs. See description on page 767

WIDER interest has been shown in conclusions than in reasoning and attempted demonstration of principles during the period while these articles have been running. It appears that the subject gains in actuality by having conclusions stated in advance and having the reasons for them stated afterwards. The preference for this order may be based on the idea that readers should be enabled to pass preliminary judgment with regard to the probable practical value of the reasoning before going to the trouble of following it. The writer yields to this view and, with a change of his original plan, presents in the following an outline of the principal conclusions with regard to spring systems to which the study of shocks and vehicle movements seem to lead. The only manner in which they could be shown completely and definitely would be in connection with detail designs of vehicles of the different classes, as in all cases there must be adaptation to established types of construction, and such elaborate work is here out of question, but enough can be said and shown to indicate to the practical builder of motor vehicles whether the constructive possibilities appeal to him and whether he will care to follow the reasoned justification of the conclusions in subsequent articles.

The elements in the demonstration which are lacking are mainly those which would take the form of showing that IN ALL CASES of road shock much bouncing of the vehicle body and of the running-gear can be avoided without increased force of impact or vibration by cutting the spring rebound short—even abruptly—at the point of static equilibrium of the spring against its load; further, that retardation of the rebound spring stroke constitutes the most suitable means for regulating the period of oscillation and becomes fully acceptable if the retarding becomes automatically stronger after sharp shocks and the spring system affords a progressively increasing resistance to spring compression; and, further, that sufficient range and softness of spring action coupled with compactness and working capacity or immunity under overload, is also best secured through a progressively decreasing flexibility.

Other conclusions have already been partly accounted for and relate to the cushioning for horizontal shocks, both longitudinal and lateral, and the advantage of employing non-vibrating material for the wheels of running-gears which are not protected against shocks by air tires. The latter conclusion was based mainly upon the observed fact that solid rubber tires are compressed by their loads almost to the limit of their compressibility and therefore transmit vibrations quite freely, through the metal of the springs, from all shocks except those due to impacts at uncompressed portions of the tire.

In the matter of constructive means for mitigating horizontal shocks it was provisionally understood that the writer can suggest only certain compromises with the requirements—different for the different classes of motor vehicles—but he believes that in other respects the system for combining spring elements which he presents in this article can be taken up and developed rationally by a vehicle builder for any given set of service requirements and can be made to cover a wider range of service conditions, both mechanically and economically, than any other combination of elements which has come to general notice in practice or theory. In this respect its merit can be judged directly by all who have practical experience, while the theoretical demonstration of the suitability of the combination for reducing both shocks and bouncing of the vehicle body to a minimum is yet to be made for a number of different and typical impacts—comprising single and compound impacts on one side or both sides of the vehicle, with the latter moving straight ahead or backward, in a curve and uphill or downhill, with load and without load—and must be made by means of charts representing the movements and forces to which the body and running-gear are subject under these different conditions.

### Need of Testing Station

Such charts, while they can be sketched to one's own satisfaction by constant recourse to approximations and offhand experiments on the road, are found difficult to present convincingly, even if they are limited to the conditions applying, for example, to a medium size delivery wagon with hard tires, but, as referred to in a previous instalment, they might be produced automatically with a rather simple testing equipment for vehicles with air tires as well as for heavy utility wagons, and it is to be hoped that such a testing equipment may be established somewhere in the industry (preferably by a tire or spring-making concern) to make all rea-

soning on the subject more convincing to the practical man.

As will be seen, either half-elliptic springs—including C-springs and platform springs as modifications of this type—or cantilever springs can be adapted to the conclusions arrived at, or *vice versa*, but cantilever springs present special inducements, being applicable in relatively short lengths. A device for checking rebound, with or without retardation of the rebound stroke, plays a rather important part in the proposed standardization of elements, as it can be adapted to perform other useful functions, such as absorbing lateral shocks and correcting that "roll" of the vehicle body for which the cantilever spring is blamed (with more or less justification, the fault lying partly in the load distribution with relation to the wheelbase).

### Combination Meeting All Requirements

Taking stock of the conclusions rapidly, it is now seen that a system planned in accordance with them must meet the following requirements, in addition to those ordinarily made which relate mostly to refinements in comfort: It must include (1) an element, such as an air spring, which can be made load-supporting and whose resistance to compression can be made so rapidly progressive as to impart the required measure of progressivity to the whole combination of which it is a part; but this element can be omitted if the load of the vehicle is practically constant and leaf springs of very ample dimensions can be employed; (2) a rebound check which stops spring extension with close reference to the position in which it is in equilibrium with its static load; (if it does not check at this point, independently of load changes, shocks received in quick succession are likely to become much aggravated at the second or third of the successive impacts); (3) design features which will serve to reduce the force of horizontal shocks, and these features must be much more effective for vehicles with hard tires than for those with air tires.

### Standardization

Quick response to slight shocks, a certain steadiness in the resistance against lateral and pitching movements of the vehicle body, the proper consideration of economy of manufacture, sightliness and the absence of all need of special attention in upkeep, are of course features that must be demanded, and, in fact, a revised spring system should not only meet the vehicle requirements but also the industrial demands for standardization, or an arrangement enabling manufacturers to cover widely varying vehicle requirements with a product in which the elements may be produced in only a few variations of dimensions. An air spring, with its possibilities for division in compartments, to vary the volume, and for varying the degree of inflation, is in this respect attractive, affording a chance for restricting the variation of leaf spring dimensions. And a rebound check with a suitable damper adjustment can also be made to answer equally well for all work ranging from very heavy to heavy, from heavy to medium and from medium to light, without any finer distinctions, if it is designed with this requirement in view.

As the question of a suitable installation of an air spring in a motor vehicle is not without practical difficulties, it would be desirable to show a definite mode of installation in connection with the accompanying sketches, Figs. 1 to 6, but the writer refrains from showing specific construction at this point, as the type to be preferred depends largely upon the design of the vehicle frame. Air springs are now employed in different forms. The Westinghouse air spring of the piston type, the Cox air cell of spherical shape and the Hoffmann construction of the diaphragm type (belonging to the Saurer concern, so far as known) are examples. Even the ordinary air tire may be looked upon in the same light, though it co-operates with the vehicle springs without any other mechanical bond between the two than the action of gravitation which affects the tire and the spring at approximately the same instant.

### The Air Leakage Problem

It can be made plain that the essential properties of an air spring needed for the system can be secured in practice without involving an onerous change in frame design, and the sketches therefore show this feature diagrammatically in several forms, each a mere symbol of the properties it represents. It should be non-leaking and should require no attention, once the pressure is adjusted to the vehicle, and these qualities can be secured. To secure them is a smaller problem, when the utility of solving it is realized, than most of those which steel makers, tire makers and vehicle builders have been called upon to solve in the past. The writer will therefore not urge or describe the method he at present considers the best for securing non-leak and no-attention properties as well as a ready command of the progressive scale of resistance to flexion. It is also true that any other spring unit affording a sharply progressive resistance to flexion can take the place of an air spring, so far as the functioning of the system is concerned, but the regulation of the rapidity of action and reaction is probably more conveniently effected with air as the elastic element than with any other material.

An air spring can have its principal dimensions inside or outside of the frame, in any convenient place, provided the range of movement which it is to allow the leaf spring, in addition to the leaf spring's own flexing movement, is effected at the place where the leaf spring abuts against it.

### Air's Contrasting Functions

In the plan for standardization the air spring serves two purposes. One is to give range and flexibility, in any desired degree, in connection with a leaf spring which is too short and stiff to act suitably alone, or, in case of operating with a half-elliptic spring, to give strength and working capacity to a leaf spring which separately would be too weak and flexible. The importance of having an element which in this manner releases leaf spring design from its practical limitations and permits their dimensions to be subordinated without harm to other vehicle design requirements was dealt with in articles X and XI. The other purpose is to supply the progressive resistance which gives great flexibility for light loads and light shocks and also sufficient range of action for overloads and sharp shocks. (For comparison it may be mentioned that the most efficient arrangement employed at present for obtaining a wide range of good action comprises a platform spring in which the action of the transverse member is limited to work with the light loads and shocks and the half-elliptics strong enough alone for the middle range, while an overload spring secured transversely in the frame above the axle helps to take care of extremes). The period of oscillation of the air spring can be regulated by introducing a resistance element in its operation, as well as by the quantity of air used and by its tension, the period being lengthened by resistance and by reducing the air volume but shortened by increasing the tension. These are factors which can be calculated and proportioned suitably for each case, still leaving great freedom in the selection of the leaf spring dimensions. If the oscillation period of the air spring is regulated separately, the regulating action which can be effected by means of the damper adjustment of the rebound check is to that extent relieved and can be reserved for the free end of the leaf spring, but in the case of fast vehicles with running-gear of light weight the free end of the leaf spring is perhaps better left unrestrained, so as to oscillate rapidly for the small inequalities of the road (performing the function for which it is frequently contended that auxiliary coil springs are useful). In the case of vehicles with heavy running-gear the

damper action may be desirable to reduce tire wear, and at all events it can be employed to correct faulty speed of the air spring.

In connection with all of the sketches, Figs. 1 to 6 inclusively, it may be best to note that their proportions, as well as the shapes, are haphazard and crude, and also that in reality the air spring element can be smaller in proportion as the leaf spring comes nearer to the dimensions which would enable it to do all the work alone.

### The Effects Obtained

One of the simplest forms of the proposed equipment is indicated in Fig. 1 and may be suitable for very light cars and other vehicles for which the location of the air spring, on the outside of the frame, and the necessity for inflating it occasionally is not objectionable. A quarter-elliptic is pivoted to the frame, and the driving thrust can be delivered through it. It rests against a short tube similar to a section of tire tube (with air tube lining) which is closed at both ends and backed by a curved flange with cups at the ends, riveted or otherwise secured to the vehicle frame reach. Flexion of the leaf spring causes an increasing area of the air tube to be acted upon in the measure as the static or shock load increases and also shortens the active portion of the leaf spring; the latter element in the action is softened, however, because the fabric does not constitute a rigid fulcrum but one permitting the spring to bend along its entire length. The oblique position of the leaf spring causes the axle A to recede under shock, so as to afford some cushioning of the horizontal shock component. The rebound check R prevents separation of the spring elements and moderates the rapidity of oscillation in the manner explained in connection with the description of this device, Fig. 7. It is in this case shown in the form in which the two arms, F and G, carry the box R, and these arms can be made so substantial, as well as flat and springy, as to serve to cushion lateral shocks and to obviate too much roll of the vehicle body at turns, and on other occasions when a tendency to roll develops. A pitching movement of the vehicle body, such as is likely to occur in case of an abrupt stop or retardation, especially when going downhill, and which consists in sudden unloading of rear springs and overloading of front springs, is also prevented by the normal action of the rebound check. (But a running-gear which is very light at the rear may be raised from the ground by an unusually sharp action of this kind, or the friction with the road may be so much reduced as to cause skidding—as well understood in the case of sharp turns of racing cars, where the retardation causes the pitching and the turn the further concentration of loads on the outside wheels in the curve—and this is one of the few good arguments against lightweight wheels and axles.)

### All Varieties Work Alike

All the functions here mentioned with reference to Fig. 1 will be observed to apply also to the designs indicated in Figs. 2, 3 and 5, and their peculiarities can be covered briefly. In Fig. 2 the cantilever spring, with fixed front pivot, has a lever L secured under its clip and shackled at its other end to transverse T of the vehicle frame. By means of this lever the air cell C is suitably actuated. Being inconspicuously mounted inside of the frame and secured to the transverse in any preferred manner, the air cell can be constructed on any one of the plans which will prevent leakage and produce an exact and predetermined scale of flexibility. The air spring on one side can readily be connected with that on the other, if this is found desirable with a view to getting increased flexibility for one-sided shocks, and thereby compensate for the additional friction which is caused in these cases by torsion of the leaf spring and flexion of the arms of the rebound check.

Fig. 3 is shown with a rebound check of the same type as in Fig. 7, with the cantilever spring shackled in front and with a transverse rod V connecting the springs on opposite sides of the vehicle. The lever L is longitudinal inside of the frame and is moved by V on which it is journaled. It is pivoted to the frame in front and the driving thrust can be delivered through it. The air cell is secured longitudinally on the inside of the frame.

### Best Shape of Flexible Cell

That the air cell is shown in all cases with a flexible element of elongated form and with a longitudinal curvature is because a flexible element affords the simplest construction, the elongated form gives the smallest flexion of fabric and the shortest mechanical actuating movement for a given displacement of air, and the longitudinal curvature permits flexion to the extent of an equal opposite curvature without stretch of fabric and therefore with a minimum of stress and deterioration. This is illustrated in Fig. 4. As a flexible tube subjected to pressure from within tends to straighten out, this design also facilitates mounting, the pressure holding the tube against its backing and into its end cups or abutments. Practically only the matter of establishing security against gradual leaking is to be taken care of additionally.

In Figs. 1, 2 and 3 the air spring supports the load and is figured for an initial flexibility much greater than that of the leaf spring. To avoid too great initial flattening under the mere static load, it may be desirable to relieve the air spring of a portion of it. Fig. 5 shows one way of doing this. The three-armed lever, inside of the frame, is pivoted to the frame reach at D, while the transverse rod V passes through the lower arm, and the third arm actuates the air cell C. The static load support is thereby divided between D and C. Probably more suitable methods may be devised.

### With Half-Elliptics

When the system is applied to half-elliptic springs, the cushioning effect against the horizontal component of shocks which is obtained from the cantilever springs in some measure by giving their movement a slight rake, is perhaps best secured by special means, especially by using converging radius rods capable of yielding slightly in both directions and so connected as to obviate turning of the axle by one-sided shocks, as referred to in previous instalments. This matter is here not entered upon further, except in connection with heavy vehicles which do not benefit from air tires.

The half-elliptic springs can be made very flexible, as their relation to the air spring provides the additional carrying

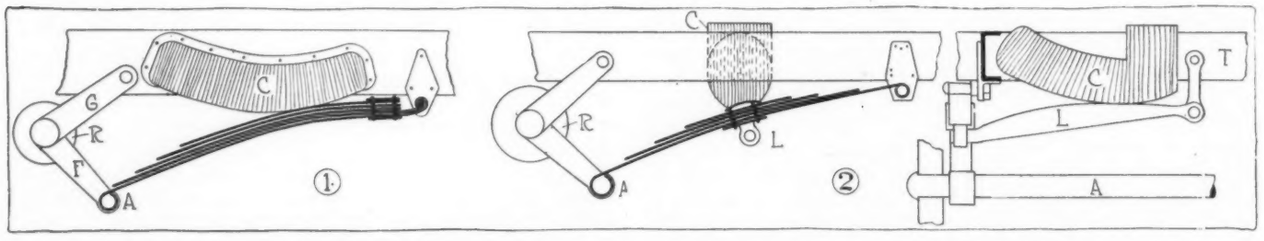



Fig. 1—Complete combination of spring elements reduced to its simplest form; for light cars with air tires, including cyclecars, delivery carts, etc. Fig. 2—Diagram, in side and end views, of general arrangement of spring elements for cars of medium weight

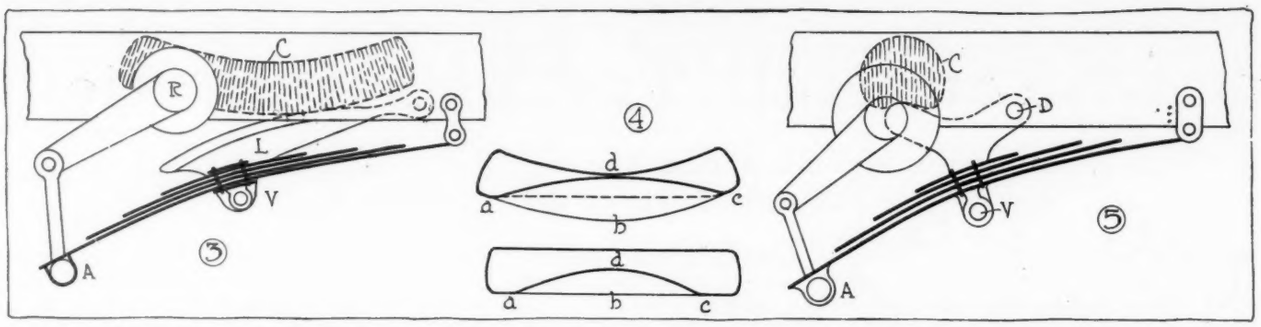



Fig. 3—An arrangement of elements which can be made suitable for motor vehicles of any class. Fig. 4—Illustrates shape of flexible cell in which fabric is never stretched by flexion; adc (flexed) no longer than abc. Below it is a cell whose fabric is stretched or strained by flexion; adc > abc. Fig. 5—A method for relieving air cell of part of static load

capacity. They may be made, for example, to fit the vehicle without load, so as to remove all load from the air spring when the vehicle is not in use. Fig. 6 indicates one of many possible ways of arranging the combination. The two upper arms of a rhombic lever, starting from the axle inside of the frame, are curved so as to raise a suitably shaped plate which compresses the air cell, the latter lying alongside of the reach. The rebound check can then convenently be on the outside.

**Modifications for Front Springs**

For front springs the cantilever spring construction, in some form, should be suitable, giving naturally a horizontal yield, and if the load on the front axle is practically constant the air cell can be small or may be replaced by a fulcrum just sufficiently yielding to admit of proper flexion, although the front pivot for the spring is fixed. The arms of the rebound check can be robust enough to help keeping the axle from swaying out of its lateral alignment, considering that the leaf spring can be very short if a flexible fulcrum is used. With an oblique position of the spring, the steering rod should probably by preference be of the transverse type, but this is a question best decided on the drawing board with reference to other car construction details in each case.

**Rebound Check and Damper**

A rebound check of such construction that it will perform the functions required is shown in sectional views in Fig. 7. It is of the hydraulic type, operating with oil. Lever 11 actuates shaft 2, in one piece with which is the piston vane 2*b*. When the vehicle axle goes up, piston 2*b* is turned downward in the interior chamber of casing 1, which is separated from the smaller front compartment by plate 4, through which the shaft passes. Driving the oil before it, piston 2*b* by this movement raises the free piston 3 on the other side of the shaft in the inner chamber. This movement is unrestricted, as the oil passage is always large past the lower stop 8 and the valve flap 6 turns freely around the fixed pin 5 when the liquid moves in this direction. Plug 7 can be screwed in or out to adjust the return flow, but cannot reach and interfere with valve flap 6. Any given adjustment can be protected by a thin locknut under its head. When the vehicle axle begins to turn back, after the force of a shock has been exhausted, the liquid is started in the opposite direction by piston 2*b*, and if plug 7 is flush with the inner wall of the chamber the flow is scarcely restricted, though valve 6 does not open, and in that case no appreciable restraining influence upon the rapidity of the spring and axle rebound is exerted until the free piston 3 has reached back to the position from which it was started. This it will do at the same moment, practically, when piston 2*b* gets back to its initial position, which is that corresponding to the position of the axle when the vehicle is at rest. A small hole through piston 3 allows a slight bypassing of oil—very slight when the movement is sharp—but the effect is the same when piston 3 goes up as when it goes down, so that the time for its return to stop 8 is not affected. The moment, however, stop 8 is reached, piston 3 opposes any further upward movement of piston 2*b* and thereby any further downward movement of the vehicle axle and any further rebound or extension of the spring. The only yielding element in the check comes by forcing oil through the small hole.

If an earlier retarding of the rebound stroke is needed in order to lengthen the period of vibration, plug 7 is adjusted to retard the oil circulation for the whole rebound. Thin oil can be used, so that temperature will have no appreciable influence upon the degree of retardation. The action of the free piston remains unchanged, except that the forces it must resist become smaller.

If the static load of the vehicle becomes smaller or greater, the initial position of piston 2*b* is changed, but that of piston 3 remains what it was, except for the moment when the change of load is effected. It returns automatically to stop 8 by gravity whenever piston 2*b* is not suddenly moved, the small hole permitting this movement. The whole action is therefore unaffected by load changes.

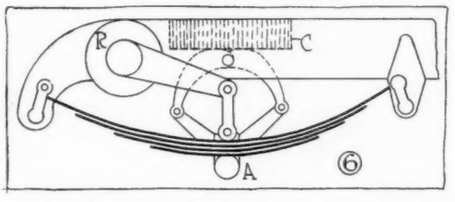



Fig. 6—Diagram of an arrangement which can be used with half-elliptic springs. Air cell could also be actuated as in Figs. 2 and 3

Other features in the construction have reference to durability, avoidance of friction and noise, as well as the total avoidance of oil leakage by removing pressure from the shaft bearings. Any oil escaping from the interior chamber by way of the bearing in plate 4 enters the front chamber which is also full of oil. A small hole in plate 4 (on that side where there is no pressure) equalizes the contents, and a copper gasket ring between screw cover plate 9 and an inserted bronze bearing bush completes the protection, and the bearings are long and large, besides. As neglect of these factors have interfered with the utility of other hydraulic devices, it seems necessary to mention them, although they are only indirectly connected with the subject of an improved spring system.

There remains to be mentioned some suitable expedient for reducing the force of horizontal shocks for vehicles operated with hard tires, as the means proposed are admittedly insufficient unless the assistance received from air tires in this respect can be counted upon. The writer at this point finds no solution, even tentative, for vehicles which are relatively light and are supposed to be driven at higher speeds than 15 or 20 miles per hour. But for heavy vehicles intended for slower driving with large loads, a certain wheel construction appears to present some inducements which may be worth investigating, so much more as the same construction no doubt

(*Continued on page* 783)

# 3 1-2-Ton Hall Truck Enters Field

## Substantially Built of Standard Parts—2 1-2-Ton and 5-Ton Models Planned—Seat and Dash Welded Steel Unit

LATEST to enter the truck field is the Lewis-Hall Iron Works, Detroit, Mich., which is an old established plant not connected with the automobile business until the bringing out of this new truck. Doing a structural steel business, the founder of the concern, Henry B. Lewis, has been located here for more than 25 years. Last year he associated H. S. Hall with himself under the present organization which was incorporated for $175,000. Mr. Lewis is president and treasurer, while the active management is shouldered by Mr. Hall, the vice-president. The concern is regarded highly in Detroit, and is of unassailable standing.

In addition to having a complete plant for the making of structural steel parts, the concern maintains a machine shop equipment, and is thus happily situated for truck manufacture. The chassis and frame are constructed by the company. W. K. Ackerman, formerly with two other truck concerns, is the designer.

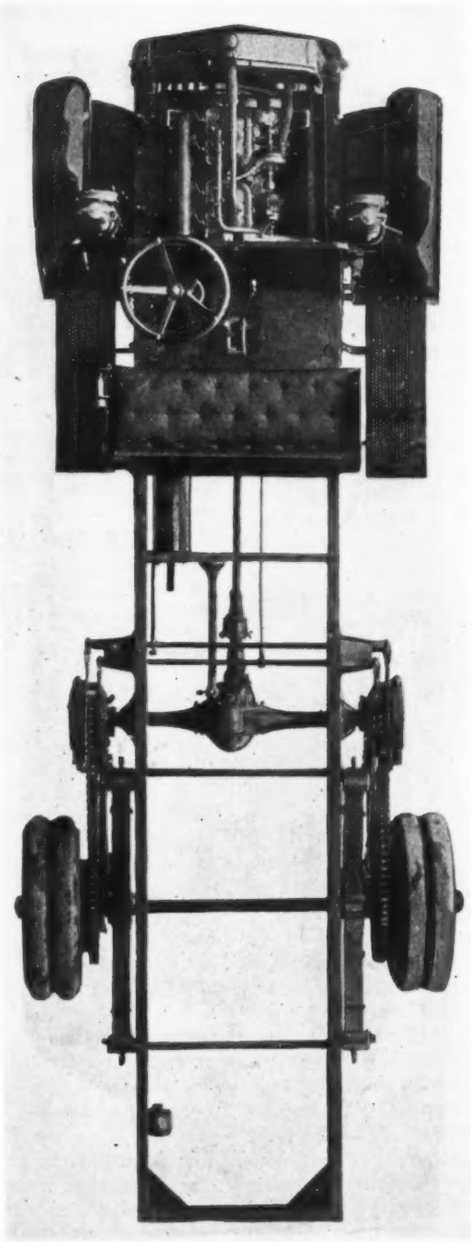
### Line Will Be Complete

The new Lewis-Hall product is known as the Hall truck, and is strictly an assembly proposition, making use of Timken axles, Continental engines, Brown-Lipe gearsets, Gemmer steering gears, Mayo radiators, etc. Though details of only the 3 1-2-ton model are given out at this time, the concern is planning to have a complete line of vehicles to meet all classes of service. Later, then, there will probably be a Hall 2 1-2-ton model and a 5-ton type. However, the model here described is typical of the Hall make, and will serve to indicate what the general design of the other models will be.

### Unit Power Plant

The Continental engine used is the 4 1-2 by 5 1-2 four-cylinder L-head type with the cylinders cast in pairs. The gearset is in unit, and the whole assembly is hung from a special auxiliary frame separate from the main frame. This is commendable construction for heavy duty service, and thus any twisting or weaving to which the main frame is subjected is not transmitted to the engine unit, a feature of design which is very desirable.

This motor has a factory rating of 45 horsepower, while the S. A. E. formula accords it 32.4 horsepower at 1,000 r.p.m. The lubrication system is of the combination force feed and splash type which should be of special advantage in truck service. The cooling is another important point to be considered for truck work, and it is taken care of by a centrifugal pump mounted on the engine base and driven at engine speed. The Mayo radiator is a cellular type and is carried on specially-designed spring buffers so that road shocks and jarring will not hurt it under normal conditions. There are coil springs above and below the carrying point, enabling the mounting to take the rebound as well as the road shock.



Plan view of 3 1-2-ton Hall truck chassis

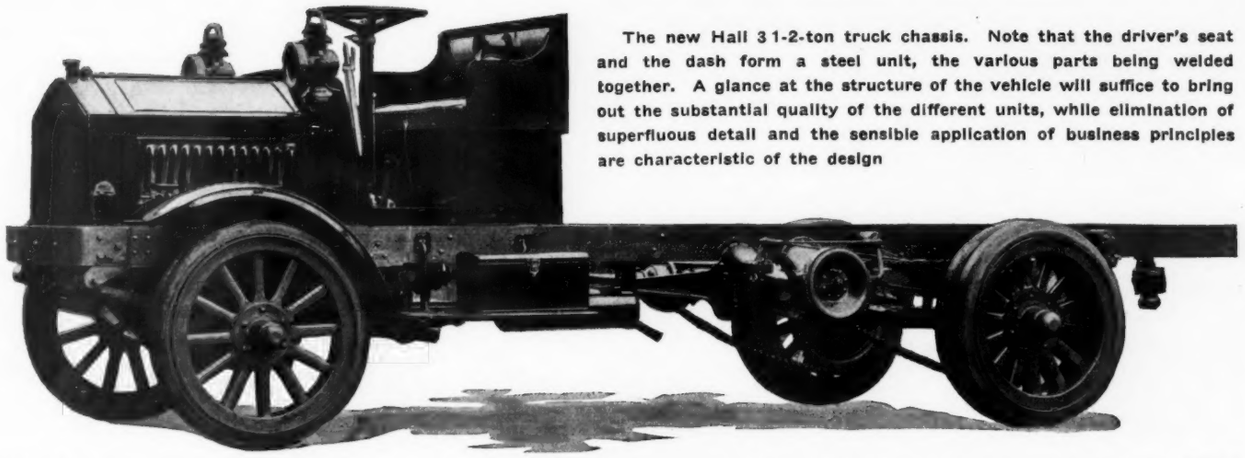
The motor uses a Zenith carbureter, in connection with which a Kramer governor is fitted which is of the intake type. It is set to get the maximum engine power at 1,140 r.p.m. The carbureter has a special by-pass to take fuel used on the idle or slow speeds through a passage directly into the butterfly valve in the governor, which valve also acts as a port to open and close the by-pass as needed. It is stated that good fuel economy results from this arrangement. Single ignition by Eisemann magneto is employed.

### Truck Is Substantially Built

The chassis construction presents no unusual features of design, but appears to be substantially built along conservative and conventional lines. The drive from the three-speed gearset back to the jackshaft is through a shaft having two universals, one at either end. The jackshaft is the regular Timken design with a ratio of 3 3-7 to 1, standard. Other ratios to meet special service are optional, however.

Then from the jackshaft, the power is sent to the rear wheels through roller chains of 1-inch width, and 7-8-inch roller form. The pitch of the chain is 1 1-2-inch. The Timken rear axle is of the dead type and the springs attach to it substantially, and run outside of the side members of the frame to their mountings. Timken bearings are used throughout the axles and the gearset.

The total gear ratio from motor to rear wheels is 9.39 to 1, standard, with other ratios optional, as stated above. The springs measure 52 by 3 1-2 inches, rear, and 45 by 2 1-2 inches front. The leaves have tapered points. The braking system employs one set of brakes on the jackshaft and the other on the rear wheels. Those on the jackshaft, the service set, have 12-inch drums,



The new Hall 3 1-2-ton truck chassis. Note that the driver's seat and the dash form a steel unit, the various parts being welded together. A glance at the structure of the vehicle will suffice to bring out the substantial quality of the different units, while elimination of superfluous detail and the sensible application of business principles are characteristic of the design

while the emergency brakes on the wheels act on 18-inch drums and expand internally.

The frame for the Hall truck is manufactured with all accessories such as brackets, step hangers, and so on, in the concern's plant from a special rolled steel channel stock. The channel is 6 inches deep, and the metal 7-16 inch thick. The frame measures 39 inches across.

**Seat and Dash Form Steel Unit**

The seat and dash construction is worthy of comment, being made from steel and welded together to make one unit. This will remove any tendency to rattle and is a substantial way of building these parts. Sockets are provided for the attaching of a top for the driver's cab. The gasoline tank goes under the seat and can hold 32 gallons.

Steering gear is worm and sector in design, and the wheel, mounted horizontally on a vertical shaft, is on the left, with control levers in the center. A feature which lends to the appearance of the truck is the use of crowned fenders. These are substantial and free from rattles.

**Loading Space of 145 Inches**

The standard wheelbase of this 3 1-2-ton model is 144 inches, which gives a loading space of 145 inches without body overhang. Optional lengths of wheelbase from 10 to 18 feet are obtainable, and frames up to 24 feet are to be had to meet special haulage conditions. The standard tire equipment calls for single front tires and duals in the rear, both sets of which are 36 by 5 size.

The standard chassis price is $2,800 with driver's seat and dash. The option of electric starting and lighting equipment at $150 additional, and of rear wheel and tire equipment of 40 by 5 size, dual, at $50 extra, are exemplary of the provision made for taking care of any requirements. Rear springs of 5-ton capacity are also fitted at an extra cost of $10.

# Commerce Jitney Bus on 1,500-Pound Chassis

FOLLOWING the lead taken by several other manufacturers, the Commerce Motor Car Co., Detroit, Mich., has placed upon the market a jitney bus, which at the same time may be used as a station, hotel and baggage bus.

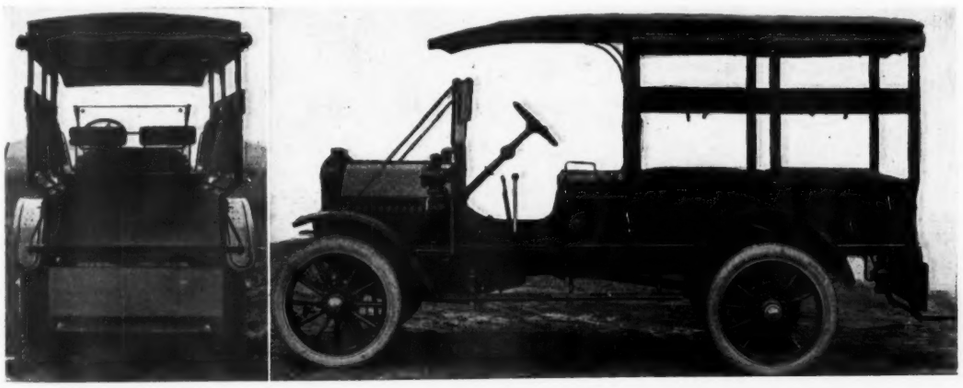
The bus is known as model S J R and is listed at $995. In general construction it is similar in all particulars except the body to the 1,500-pound trucks made by the same company and which sells at $975.

The new bus has room for nine passengers in addition to the driver. The seats are in pairs of two, so that if only four passengers are in the bus the other four rear seats can be folded up out of the way and the space used to carry the luggage. Entrance is from the rear with one seat next to the driver.

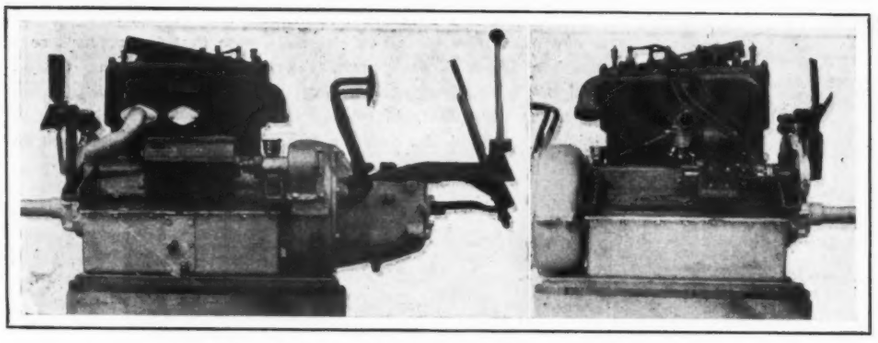
The length inside is 73 inches, the width 42 inches. Between seat backs the width is 48 1-2 inches. The height inside is 56 1-2 inches and the width of the aisle 15 1-2 inches. There is a clearance of 10 1-2 inches between the floor and the seats, while the height of the tail gate is 12 inches. Wheelbase of the vehicle is 107 inches and the tread 56 inches. A four-cylinder Continental 3 1-2 by 5 power plant is used. The carbureter is a Holley, the ignition Eisemann and the gearset of the three-speed type.

The rear axle is a Salisbury three-quarter floating. The wheels are of the artillery type and are shod with pneumatic tires 33 by 4, front and rear.

Gray & Davis starting and lighting system is furnished at an additional cost of $125, while gas lights and Prest-O-Lite tank are $35 extra.



Rear and side views of the Commerce combination jitney, station, hotel and baggage bus. Note how the seats fold out of the way when not in use



Side views of the Clark motor used with the Kearns Trio

# Quick Detachable Bodies on Kearns Cars

## Runabout Touring or Light Delivery Types Interchangeable Within 10 Minutes

SOMETHING new in the way of a combination car has been brought out by the Kearns Motor Car Co., Inc., Beavertown, Pa. It is known as the Kearns Trio and, as the name expresses, is a three-in-one car unit which can take the form of either a runabout, a touring car or a light delivery wagon of 800 pounds capacity.

### Change Back of Foredoor

This three-body car is different from previous combinations because the entire body is not changed but only the part back of the foredoor. By slipping on the extra rear portions of the different bodies, the three combinations are made. With this arrangement the car is always the same from the radiator as far back as the rear end of the door to the driver's compartment. Beyond this point the additions which are slipped in place make the car either roadster, touring or commercial. The car can be bought in chassis form without any of the bodies, or it can be bought with any one of the three or the complete outfit. When sold with a runabout body it is styled Model R, with the touring body Model T and with the delivery body Model D. Any of the bodies can be attached within 10 minutes, there being but four bolts to remove. All the other parts of the car are contained in the cowl section and other parts of the permanent chassis and hence there need be no change in wiring or gasoline connections.

One of the advantages of this style combination car is that should it be desired to change bodies later, it can be done readily and if the car is ever put upon the used car market, it can be furnished with a delivery body after it has served its period as a passenger design.

### Follows Standard Practice

Mechanically, there is nothing about the car which deviates very strongly from standard practice except in the method by which the three bodies are attached. The touring car is a five-passenger design and other than its detachable arrangement gives the appearance of a lightweight design of ample roominess. The details are all of standard design as would be expected in a car which is assembled from the products of the parts makers.

The motor is made by the Clark Engine and Boiler Co., Kalamazoo, Mich., and is a four-cylinder block design giving a 2.875 by 4.5-inch power plant. The cylinders are cast in a unit with the top half of the base from gray iron and are reamed to standard size. The cylinders are interchangeable and are provided with waterjackets which pass completely around each cylinder head is cast separately and can be readily removed to reach the combustion space for the purpose of removing carbon or reaching the valves for grinding. The lower half of the crankcase is made of aluminum alloy and is entirely in one piece with the oil pan at the bottom. The center half and top half of the crankcase form a full housing over the flywheel, to which is bolted the gearbox. The motor is suspended at four points.

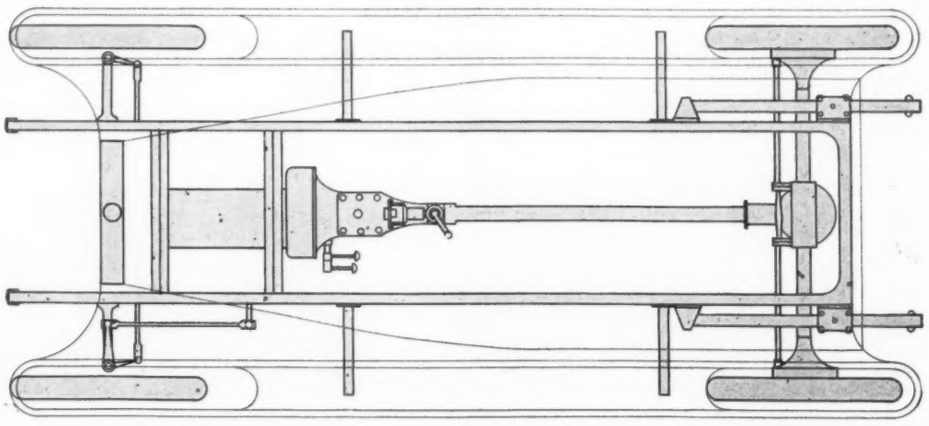
### Valves Are Accessible

The valves are all on the left side of the motor and are operated through mechanism which is entirely inclosed. The valve can be reached for adjustment by removing a side plate which is held in place by means of a large hand nut. Both inlet and exhaust valves have a working diameter of 1.25 inches and all the working parts are hardened and ground. The pushrods are mushroom design of nickel steel, hardened and ground.

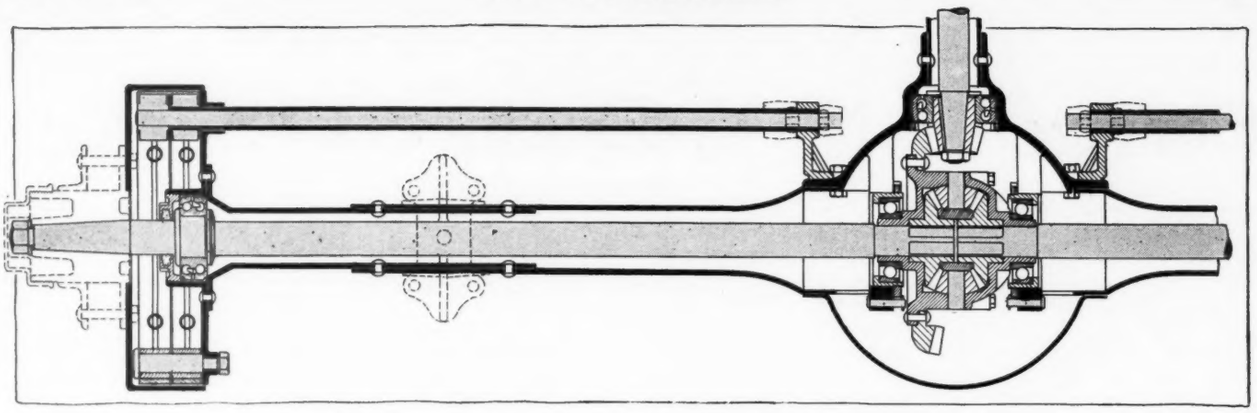
The pistons are gray iron castings, being of the same material as the cylinders. The rings are also cast iron and the piston pins are open hearth steel hardened and ground. The connecting-rods are drop forgings from open-hearth steel and are I-beam in section and heat-treated to give the best possible rigidity. Each of these rods is kept to an absolute uniformity in manufacture by machining to jigs.

### Camshafts Made in One Piece

The camshafts are drop forged from open-hearth carbon-steel and are also hardened and ground, being manufactured in one piece. These shafts are carried on three bearings with cams designed to provide a quiet action. The crankshaft is



Plan view of chassis employed for the new Kearns product with three interchangeable bodies



Sectional view of rear axle and brake mechanism on Kearns car

a drop forging from open-hearth steel, heat treated and ground. It is carried on three main bearings which are lined with die-cast nickel-babbitt. The sizes of the bearings are 1.625 by 2.5 inches at the forward end, 1.625 by 1.875 at the center and 1.625 by 3 inches at the flywheel or rear end. The diameter of the crankshaft is 1.625 inches. These shafts are balanced both dynamically and statically on each motor.

### Silence an Aim Throughout

Throughout the motor the design has been made with a view towards securing silence as far as possible. Some of the representative features which make for this end are helical timing gears, inclosed valves, and main bearings of ample size. The cams are also designed to give an easy lift and the valve adjustments are such that play can be taken up between the valve stem and end of the pushrod.

### Thermo-Syphon Cooling

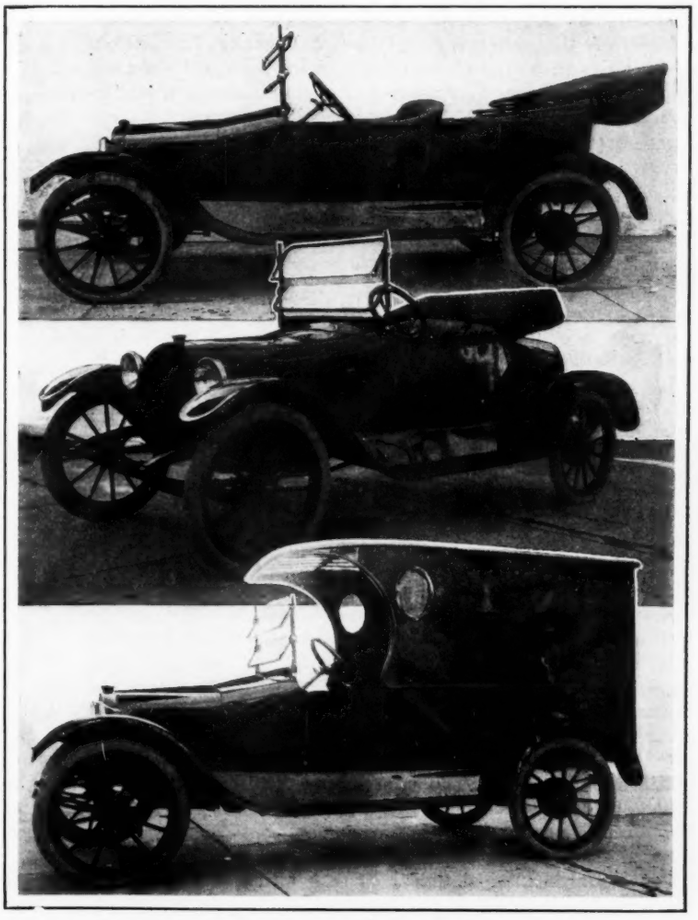
Cooling is by thermo-syphon, the water header being cast directly with the cylinder head, as shown in the illustrations herewith. The water pipes are so designed that connections can be made to the radiator without bending the hose. The exhaust manifold is cast iron and the inlet manifold is cast within the waterjacket of the cylinder, being designed for a side inlet carbureter bolted directly to the cylinder wall. Lubrication is a combination force feed and splash system, the oil being pumped positively to the main bearings and also into splash pockets beneath each connecting-rod.

Power is delivered through a multiple disk clutch to a three-speed gearset which has the change speed lever mounted directly in the center. The rear axle is a three-quarter floating design and the differential can be taken out of the rear housing plate without taking down the entire axle. Axle shaft diameter is 1.25 inches and it is carried on a double row of ball bearings. Both emergency and service brakes are inclosed and operate against the same drum being of the expanding type. The brakes are worked through equallizers attached to the central part of the axle, one brake being worked by a tube and the other by a rod which passes through the tube.

### Electric Lighting Standard

The head lamps are attached in an original manner being directly in connection with the bonnet. The lamps are light and put no strain according to the claims of the company, upon the radiator. Electric lighting is supplied with the car which markets for prices between $650 and $750 according to which outfits are specified. The wheelbase is 107 inches, the tread standard and the tires 30 by 3 1-2. It is stated that a speed of 45 miles per hour can be made.

Ample room is provided in the bodies and the fitting has not been neglected. The space back of the seat in the delivery wagon is 39 by 58 inches, affording ample room for light package room, etc., up to 800 pounds. The runabout is especially adapted for carrying luggage in the rear, the space back of the seat being 15 inches high by 36 inches long and 40 inches wide. The touring car is a five-passenger design and is upholstered in heavy black mule skin with soft hair cushions. Spare tires are carried on the rear and equipment is complete with an extra rim. The touring body includes robe and foot rails with one man top.



Three bodies which can be fitted optionally and interchanged within 10 minutes on the Kearns chassis

# Service Is N. Y. Engineers' Subject

## Metropolitan Section of S. A. E. Discusses Truck Makers' Obligations to Customers—Arguments for Improvement in Systems, Providing for Inspection, Etc.

NEW YORK CITY, April 23—Service and the Commercial Car Engineer was the topic of the regular April meeting of the Metropolitan Section of the Society of Automobile Engineers which was held last night at the service station of the Autocar Co. in this city. The paper was by B. B. Bachman, assistant engineer of the company, who demonstrated his points later during a tour through the building participated in by the members present. A digest of the paper follows:

It is an undoubted fact that the present is an age of service. Leaders in all lines of endeavor have recognized the value and benefit to be derived from a competitive standpoint, in excelling in this much advertised phase of modern business. The retail merchant, the expressman, the contractor, hotel proprietors at resorts and in our cities, realizing the need of leading their competitors or of getting into a competitive position, are turning to this new tool as a means to attract patronage.

A large majority of these prospective or actual users of commercial vehicles are not in a position to care for them outside of the necessary routine matters of lubrication, minor adjustments, cleaning, etc., and in these feel the need of expert advice and assistance. In addition to this, the early attempts at developing motor vehicles necessarily were based upon experience gained from the earlier cars constructed for passenger transportation. They were therefore full of imperfections and to this fact many of the pioneer users of motor vehicles can testify.

Therefore, to meet the need created by the lack of knowledge of the operator, and, second, to reenforce the unavoidable mechanical defects of the cars so as to minimize their effects to the user, and, third, to keep in close contact with the cars in actual service so as to collect data which will enable the builder to improve his product—to a point which will gradually eliminate the second factor—there has arisen the service department operated by the builders of commercial cars, and to a lesser extent, passenger cars.

### The Organization of the Branch

Having briefly outlined the reasons for the existence of the service department, it would seem to be in order to sketch the development of the organization and in doing this the author must draw on the experience of the company with which he is connected.

The Autocar Co. entered into the manufacture of commercial vehicles in 1907 and prior to that time had been marketing its passenger cars in the customary manner through agents and two branch houses. Upon entering the commercial field, however, the officers of the company recognized the need of closer co-operation with their customers as outlined above and the policy of marketing through branches was adopted. This led to the organization of the Autocar Sales Co., operating in New York and the Autocar Sales & Service Co., operating in Philadelphia, Boston, Providence, Newark, Baltimore and Chicago. In addition to these, there is an agency in Los Angeles and agencies in smaller points, principally appointed by the branches.

The organization of these branches is roughly, as follows: first, the accountants which have, in the nature of things, close relation with the financial department of the parent company; second, the sales department operating under the advice and direction of the factory sales manager; third, the service department, including the repair shop and stock rooms operating in harmony with the production manager and engineer of the factory. It is with the last phase of the organization that this paper will attempt to deal.

### Functions of Service Department

The functions of the service department are first, the repairing and overhauling of customers' cars; second, inspection service, both to customers garaging at the branch and those not doing so; third, the supplying of repair parts for customers who do their own repair work.

The head of this department is the mechanical superintendent, or service manager, and under him the repair shop foremen and storekeeper. The first and third functions mentioned above are obvious and need no elaboration. The second is covered as follows: Those customers who garage at the branch may avail themselves at a slight extra charge of a nightly inspection covering minor adjustments and lubrication. Those who do not garage at the branch but who are located within reasonable distance may by appointment with the mechanical superintendent bring their cars to the branch for inspection and adjustment. Where these are of a minor nature, there is no charge, but where there is material or extensive time involved, the need for such work is reported to the owner and upon receipt of his order the work is done and charged for.

A traveling inspector covers the territory within a radius of approximately 25 miles of the branch, visiting customers in these points monthly. Any minor adjustments which he makes are not charged for, but where he sees the need for certain major repairs, he reports to the owner and if possible, makes them immediately. If material is needed which must be procured from the branch, he reports to the superintendent who arranges a convenient time with the customer when this work can be done. In this way the inspection service is made of real benefit to the customer and is still self-supporting and does not become an unreasonable burden on the manufacturer.

### Service Department and Engineer

It can be readily seen that the service department in its various activities can be of inestimable value in assisting the engineer.

In the first place, the repair orders and the record of the work done in the repair shop contains an invaluable fund of information, relative to the portions of the mechanism which, in the hands of the user, give trouble, either due to inherent defects in the design or construction, or to the misuse and abuse to which the car is subjected by the operator by reason of the demand of his business or his lack of skill and knowledge of the mechanism which he is handling.

There can be no question but that a vehicle, to be commercial and practical, must be so constructed as to not only stand up under the normal and legitimate uses to which it should

be subjected but also so far as possible to those abnormal and illegitimate uses which are the result of conditions as they are and not as they should be.

It may be said with a great deal of truth that the user should and must learn the operation of his car, but the engineer who takes that attitude and does not recognize his responsibility in learning the practical phases of the situation can never succeed in producing anything but a beautiful child of theory which may or may not be able to do the work for which it was intended, but which enters its field of usefulness with an appalling handicap.

To this end the repair orders and inspection reports are carefully scrutinized and the data obtained tabulated for comparison, thus giving a basis for determining the merit of various forms of construction and the direction in which development work should be carried.

### Assistance by the Engineer

The data obtained as explained before is also used to bring the efficiency of the various branches up to a common place. This is done by sending reports at intervals to the various branches showing the average cost of repairs at the various points for comparison.

In addition to this specific investigations are made on detailed repairs over definite periods and figures for comparison obtained on, say, connecting-rod repairs and adjustments, brake repairs, etc. This has the effect of creating a spirit of friendly rivalry which raises the efficiency of the whole organization. To further this work and obtain the maximum benefit, the engineer, or his representative, visits at regular intervals, all the branches and investigates the methods of doing various jobs and the tools and appliances used. Finally, at intervals regulated by the engineer, the superintendents are all gathered in conference at the factory and these various points all gone over in detail.

At these meetings the comparative repair costs are carefully gone over and the experience of those points having the better showing is given for the benefit of all. There is also an opportunity at this time for an inspection of the factory and a study of improved methods of construction and production.

The result of this policy has been the gradual refinement and perfection of the product, the satisfying of the user and the building of a close knit, high grade, harmonious organization which operates to accomplish one object.

### Discussion Considers Ideals

The pith of the discussion was on how close the practical service plant could reach the idealistic condition as recognized by the majority of automobile manufacturers. Many brought up the relation of the sales department to the service department, pointing out that the claims of the salesmen for the service department were often exaggerated in securing sales and this condition afterwards resulted in misunderstanding with the user of the truck. W. P. Kennedy stated that, in his opinion, the ideal condition would be if the manufacturer could guarantee the annual service costs to the consumer. He pointed out, however, that this was hard to reach because of the great demands made by some consumers on the service station, which, while out of proportion to the initial price of the truck, are often granted for policy's sake.

Joseph Anglada asked Mr. Bachman, the author of the paper, what he believed would be the just method to handle a hypothetical case such as the breaking of an axle or wheel, for instance, which in turn caused the fracture of other parts of the car. He wanted to know if Mr. Bachman thought that under such circumstances the car manufacturer was in duty bound to replace all the parts broken or not. Mr. R. McA. Lloyd, chairman, asked if there should not be a definite radius of action to the service work of a factory. He asked specifically if there should not be some arrangement in the outlying districts for garages to handle the work in order to expedite repairs for truck users in the outlying district.

Henry G. McComb, engineer of the Gasoline Division of the General Vehicle Co., stated that it is the experience of his company that it is best to secure the services of the best maintained garage in each district. He stated that it is the practice of his company to go into a certain locality and pick out the cleanest garage, as it is always the case that a clean garage does good work. He made the somewhat startling statement that only two or three service stations in the New York City district are clean and the mere fact that the others are not kept up to the best standard in this direction shows that the work must suffer.

Another line which the discussion took and which was participated in by several of the members present, was whether the head of the service station should be a business man or a mechanic. Arguments were advanced on both sides but the consensus of opinion seemed to favor the business man since he would be better equipped to be a master of the broader phases of service rather than in its mechanical details. The service manager should be on a par with the sales manager, and these two departments should be absolutely divorced from one another.

### Bachman Sums Up

In summing up, Mr. Bachman stated that he did not believe that it would be ever possible to reach the idealistic condition in service. He brought up the view which has often been held that this state could be reached through the service contract system in which a certain maintenance guarantee is given with the sale of the truck. He stated that his company had to abandon this and others have also.

Answering Mr. Anglada's question regarding the extent to which the service department should make good on repairs, he stated that it was a matter for investigation as to who was responsible for the damage. If the entire damage was due to a defect in the material or design of the car, the company manufacturing the car stands back of it and defrays the expenses.

At the business end of the meeting, the secretary's report showed that a gain in membership of fourteen has been made since the last meeting of the section, bringing the total membership up to 155. After the discussion, A. B. Cumner, of the Autocar Co., took the engineers through the service building and pointed out the systems by which the repairs and garaging of the cars are looked after.

After the meeting the members adjourned to a neighboring restaurant where a supper provided by the Autocar company was served. The meeting was well attended, considering that it fell upon the same day as the Standards Committee meeting in Detroit, there being about sixty present.

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NEW YORK CITY, April 24—"Why Service Conditions Should Be Investigated and Recommendations Made Before Selling a Customer," is the title of an address that will be delivered by Vernon Monroe, president of the International Motor Co., at the motor truck convention in Detroit on May 5 and 6. Another one of the nine papers that have been arranged for is "What Can Be Done to Improve Conditions in the Truck Business?" to be delivered by J. R. Van Allen, of the Atterbury Motor Car Co.

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NEW YORK CITY, April 24—Among the papers to be presented at the convention of the National Electric Light Assn., San Francisco, June 7 to 11, 1915, will be two of particular pertinence to electric vehicles. "The Electric Vehicle and the Central Station" will be presented jointly by J. F. Gilchrist and A. J. Marshall; W. P. Kennedy will prepare a paper to be read by Mr. Edwards, chairman of the committee on accounting of the N. E. L. A., on methods of accounting costs of operating electric vehicles.

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# Things That Count

TAKEN together the reports of the divisions of the standards committee, though brief, suffice to show once more how great a work the Society of Automobile Engineers is doing. The matters in hand just now are perhaps not so spectacular as some of the past work of the standards committee, but their usefulness is none the less immeasurable. For instance, to find 300 different sizes of cotter pins in use on automobiles and to reduce them to forty-one that will meet all requirements is an achievement which is apt to pass without due credit, because the article in question is so insignificant. Yet a moment's thought shows us that thousands of people will benefit in time and money because of the elimination of some 259 useless sizes of cotter pins.

Although it is at the very commencement of its labors and has nothing whatever as yet to its credit, the new division whose duty is to endeavor to fix international standards that will be common throughout the world has a road before it full of opportunity for great achievement. Coming nearer home, the experiments being made on headlight glare will react on the daily life of the majority of the inhabitants of this country. It is the mission of the S. A. E. standards to bring order out of chaos, and the progress reported at Detroit last week shows that the work is being carried on more expeditiously than ever.

# Real Prosperity

THAT day and night shifts, constantly increasing facilities and working forces do not suffice to enable Detroit parts and accessory manufacturers to keep up with the spring rush of orders will hardly be taken as an indication that the prosperity characterizing the automobile industry throughout the recent period of business depression is of the inflated variety. Here and there reports have arisen to this effect from time to time but no one has appeared to substantiate them and no evidence to support such rumors has appeared. Meanwhile the prosperity in both automobile and accessory branches continues; day and night shifts and rapidly increased manufacturing facilities are the rule and still the orders grow steadily from day to day.

# Annealing

THE importance of proper annealing must not be overlooked. In these days when the necessity of getting the most out of a given steel is so well recognized it seems hardly possible that great care should not be taken in the heat bath. On the other hand, however, many of the failures that are rather vaguely laid at the door of the crystallization myth are simply due to a lack of care in the annealing after the metal has been worked at a temperature at which its interior structure is upset.

Whether or not an actual change takes place in the crystalline formation of the steel under repeated stresses does not materially influence the fact that proper annealing will give these parts which are subject to repeated stresses a greatly increased lease of life. If those who either slight the work of annealing altogether or who do it in a manner which does not thoroughly reorganize the disturbed crystalline formation, would only study the micrographic photographs of specimens of cold-worked material before and after annealing they would quickly see the necessity for accuracy in this practice.

Sheets and bars of steel are often rolled and worked at temperatures which are so low that distortion of the inter-molecular structure cannot help but result. A neglect of the annealing in its entirety is rare, but it is not uncommon to find it neglected in part. The temperature of the entire piece will not be raised to that in which a reformation of the crystals takes place because the part is not left to soak a sufficiently long time in the heat of the annealing furnace. The result is that the exterior portion of the piece which has been raised to a higher temperature is strong and solid, whereas the interior forms a weak core without the strength to withstand the stresses of hard work.

There is a safe method to pursue in annealing, namely, determine first the critical point of the metal with which one is dealing or, in other words, the point at which the carbon passes into solid solution with the iron, and then allowing the metal to remain in a furnace which has a heat sufficiently above this temperature to make sure that the part will be heated throughout.

# 200 Delegates for Detroit Truck Convention

## At Least 36 Concerns To Be Represented, Some Sending 4 Men—Complete Program

DETROIT, MICH., April 28—The Motor Truck Convention to be held here May 5 and 6 is already an assured success, more than 200 delegates being a conservative estimate of the expected attendance as judged from acceptances received by the National Automobile Chamber of Commerce to date.

The following concerns have notified the Chamber of Commerce that they will have delegates present:

Adams, Armleder, Atterbury, Autocar, Baker, Chase, Commerce, Couple-Gear, Denby, Federal, General Motors, General Vehicle, Indiana, Kalamazoo, Kelly, Kosmath, Maccar, Mack and Saurer, Moon, Menominee, Packard, Pierce-Arrow, Reo, Republic, Selden, Signal, South Bend, Standard, Sternberg, Studebaker, Velie, United, Walter, Waverley, White and Wilcox. Many of these concerns are sending four or more.

The program is practically complete and gives promise of being one of the most interesting. Papers are generally limited to 20 minutes with 40 minutes for discussion and those delegates to take leading parts in discussion have already been notified of what will be expected of them.

The convention opens on Wednesday, May 5, at 1.30 p. m., which follows the regular meeting of the N. A. C. C. Board of Directors held during the forenoon.

There will be a theater party Wednesday evening at the Detroit Opera House. On Thursday there will be two sessions, a forenoon one beginning at 9.30 and and an afternoon one at 1.30. The complete program follows:

WEDNESDAY, MAY 5.

10 a. m.—12:30 p. m.—Meeting of N. A. C. C. Board of Directors.
12:30—1:30 p. m.—Get-acquainted Luncheon, Banquet Hall, Statler Hotel.

First Business Session.

1:30 p. m.—Address of Welcome by Charles Clifton, President National Automobile Chamber of Commerce.
1:45 p. m.—Appointment of Chairman.
1:45—2 p. m.—Announcements.
2:00—5:30 p. m.—Papers and Discussions.
How Can Physical Problems that Militate Against Economical Use of Trucks Be Improved?
By D. Beecroft, Directing Editor Commercial Vehicle.
What Can Be Done to Improve Conditions in the Truck Business?
By John W. Van Allen, Atterbury Motor Car Co.
How Can the Used Truck Question Be Handled?
By W. L. Day, General Manager, General Motors Truck Co.
Can Manufacturers Have a Standard Service Policy?
By Alvan Macauley, Vice-Pres. Packard Motor Car Co.
Appointment of Committee on Service Policy Resolution.

WEDNESDAY EVENING, May 5.

8:00—11 p. m.—Theatre Party, Detroit Opera House.

THURSDAY, MAY 6.

Second Session.

9:30 a. m.—12:30 p. m.—Papers and Discussions.
Can the Dealer Make Money Selling Motor Trucks, and If Not, What Is His Function?
By Robert O. Patten, Sales Manager, Pierce-Arrow Motor Car Company.
Advantages of Selling on Time Payments and How Such Sales Should Be Handled.
By W. T. White, President The White Company.
Why Service Conditions Should Be Investigated and Recommendations Made Before Selling a Customer.
By Vernon Munroe, President International Motor Co.
Is There a Need for Motor Truck Shows or Demonstrations and What Form Should They Take?
By M. L. Pulcher, Vice-Pres. Federal Motor Truck Co.
Appointment of Committee on Show or Demonstration Resolution.
12:30—1:30 p. m.—Buffet Luncheon.

Third Session.

1:30—5:30 p. m.—Papers and Discussions.
Can a Standard Load Rating Be Devised and Approved by the Manufacturers?
By H. Kerr Thomas, Asst. Manager, Pierce-Arrow Motor Car Co.
Appointment of Committee on Load Rating Resolution.
The Clayton Act and Powers of the Federal Trade Commission.
By Charles Thaddeus Terry, General Counsel for the N. A. C. C.
Extra Papers and Discussions.
Reports of Committees on Resolutions.

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# To Open Yellowstone Park to Tourists

WASHINGTON, D. C., April 24—Secretary of the Interior Lane this week approved the plan to open Yellowstone National Park to automobiles this summer under regulations which will later be prescribed and has fixed August 1 as the date for their admission. This is the only national park which motorists have not hitherto been allowed to use. In 1913 the Interior Department threw open Yosemite National Park to motorists, under careful regulations, and it has resulted in a very much wider use of that park.

The problems in the Yellowstone were more complicated, as there is a very heavy stage traffic over the roads, which hitherto have not been in satisfactory shape to be thrown open to automobiles. The stage travel in the Yellowstone this summer will be particularly heavy, and the secretary deemed it advisable not to let the machines in until the late summer, when the superintendent of the park will have everything in readiness for their admission. Telephone lines are to be extended and checking stations established at important junction points, so that the machines can be kept under absolute control. The privilege is extended to pleasure vehicles only.

Plans carefully worked out by officials of the Interior Department, with the cooperation of the army officers at the park call for a schedule which will keep the automobile traffic entirely independent of the stage traffic. All the regular traffic will move in one general direction in making the circuit of the park, the automobiles leaving half an hour before the stages, both morning and evening, from the different entrances or from the intermediate stations at which they are checked in.

It is expected that the road through the park will be a link in the highway to the Northwest, and will give the motorist who is contemplating a western trip an opportunity of seeing several of the other national parks. Mt. Rainier and Crater Lake National Parks could be visited and the motorist continuing his tour through California could visit the expositions at San Francisco and San Diego, and cross over the Sierra Nevadas on his return journey, through the Yosemite National Park, over the scenic Tioga Road which Secretary Lane has just accepted on behalf of the Government.

Except at its main entrance through the valley of the Yellowstone on the north, the Yellowstone National Park is entirely surrounded by natural forests. To the north are the Gallatin and Absaroka National forests. On the east the Shoshone and Beartooth, on the south the Teton and on the west the Targhee and the Madison. The central portion is practically all an undulating volcanic plateau having an elevation above the sea level of about 8,000 feet. This comprises an area of about 2,000 square miles out of the total of 3,350 of which the park is composed. The park is 52 miles across from north to south and 54 miles from east to west.

It is in the geysers and canyons that visitors will find their chief interest. Excelsior is the largest geyser, having a crater of 300 feet long and 200 feet wide. It has not been active since 1890. Another geyser, probably about the most interesting, is Old Faithful which at regular intervals of from 65 to 70 minutes throws a column of hot water 2 feet in diameter to a height of from 125 to 150 feet. The eruption lasts from 4 to 4 1-2 minutes. The Giant at intervals of from 2 to 4 days throws up a column to a height of 250 feet for 90 minutes.

The Grand Canyon which the Yellowstone has cut for itself through the rocky bed has produced scenic effects which are claimed to be unequaled. Its length is 24 miles and is from 600 to 1,200 feet deep. Its ragged, broken walls which are inclined at very steep angles are of a richness of color which is beyond adequate description.

# Champion - Frontier Suit Ended

## Business of Frontier Specialty Co. Transferred to Champion —Frontier Licenses in Force

TOLEDO, O., April 24—The Champion Spark Plug Co., of this city today signed papers which transfer the entire business of the Frontier Specialty Co., Buffalo, N. Y., to the Champion company. By this transfer the legal controversy between the Frontier company and the Champion company over the question of priming spark plugs comes to an end, the suit brought by the Frontier concern against Champion in November, 1914, for infringement of the Simms and Shea patents covering priming plugs being dismissed.

The licenses issued by the Frontier company covering its priming plugs will remain in force under conditions as existing before, with such concerns as Benford Mfg. Co., Sharp Spark Plug Co., Emil Grossman Mfg. Co., Rajah Auto Supply Co., Bigsby Mfg. Co., Reflex Ignition Co., and A. R. Mosler Co.

The Champion Spark Plug Co. will henceforth manufacture the All-In-One plug known as the original spark plug with priming cup.

### Internal Gear Drive Assn. Is Formed

DETROIT, MICH., April 26—An organization of the makers of the internal gear drive type of truck rear axle and of truck manufacturers using this design of axle has just been effected here under the name of the Internal Gear Drive Assn. Headquarters have been secured in the David Whitney Building, and George M. Davis has been made manager.

Among the members of the new organization are the Torbenson Gear and Axle Co. Newark, N. J.; the Russel Motor Axle Co., North Detroit; the Celfor Tool Co., Buchanan, Mich.; the Republic Motor Truck Co., Alma, Mich.; and the Denby Motor Truck Co., Detroit. In addition there are several concerns now contemplating taking on this type of drive for at least some of their models, and also some of the accessory people, but the names of these are withheld at this time.

The main object of the organization is to become a clearing house for information on this type of drive. An educational campaign among dealers and users is to be inaugurated, thus to acquaint them with exactly what the type is.

Mr. Davis states that it will not be the policy to fight other types of rear drive, but rather to promote the internal gear without reference to others' constructions.

## Market Reports for the Week

NEW YORK CITY, April 27—Market prices this week were steadier. Changes for the most part were as usual in the metals. Lead was constant at $4.17 1-2 per 100 pounds. Bessemer steel and open-hearth steel remained unchanged at $19 a ton, with large sales. Gasoline was strong at 12 cents a gallon. Both electrolytic and Lake coppers were strong and higher this week, the former closing at a 3-4-cent gain and the latter at a 1-cent gain. Both reached new high marks for the year, electrolytic at 18 cents on Monday and Lake at 19 cents on the same day. Tin closed at a drop of $4.00 per 100 pounds after a fluctuating week. About 2,000 tons of this metal is in steamships at dock in this city, but little, if any, will be available for April delivery. Consequently tin for prompt shipment is scarce. The rubber market was steady with the demand restricted to small lots and offerings light. At the closing on Monday, Fine Up-River Para came down 1 cent in price, closing at 60. Rubber shipments are steady. No changes occurred in the oils and lubricants markets.

| Material. | Tues. | Wed. | Thurs. | Fri. | Sat. | Mon. | Week's Changes |
|---|---|---|---|---|---|---|---|
| Antimony | .22½ | .22½ | .23 | .25 | .21 | .21 | —.01½ |
| Beams & Channels, 100 lbs. | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | ..... |
| Bessemer Steel, ton. | 19.00 | 19.00 | 19.00 | 19.00 | 19.00 | 19.00 | ..... |
| Copper, Elec., lb. | .17¼ | .17⅝ | .17¾ | .17¾ | .17¾ | .18 | +.00¾ |
| Copper, Lake, lb. | .18¼ | .18½ | .18½ | .18½ | .18½ | .19 | +.01 |
| Cottonseed Oil, bbl. | 6.65 | 6.70 | 6.59 | 6.65 | 6.60 | 6.60 | —.05 |
| Cyanide Potash, lb. | .21 | .21 | .21 | .21 | .19 | .21 | ..... |
| Fish Oil, Menhaden, Brown | .41 | .41 | .41 | .41 | .41 | .41 | ..... |
| Gasoline, Auto, bbl. | .12 | .12 | .12 | .12 | .12 | .12 | ..... |
| Lard Oil, prime | .92 | .90 | .90 | .90 | .90 | .90 | +.02 |
| Lead, 100 lbs. | 4.17½ | 4.17½ | 4.17½ | 4.17½ | 4.17½ | 4.17½ | ..... |
| Linseed Oil | .62 | .62 | .62 | .62 | .62 | .62 | ..... |
| Open-Hearth Steel, ton | 19.00 | 19.00 | 19.00 | 19.00 | 19.00 | 19.00 | ..... |
| Petroleum, bbl., Kans., crude | .40 | .40 | .40 | .40 | .40 | .40 | ..... |
| Petroleum, bbl., Pa., crude | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 | ..... |
| Rapeseed Oil, refined. | .. | .. | .. | .. | .. | .. | ..... |
| Rubber, Fine Up-River, Para | .61 | .61 | .61 | .61 | .61 | .60 | —.01 |
| Silk, raw, Ital. | 3.90 | .. | 3.90 | .. | .. | 3.90 | ..... |
| Silk, raw, Japan | 3.50 | .. | 3.50 | .. | .. | 3.50 | ..... |
| Sulphuric Acid, 60 Baume. | .90 | .90 | .90 | .90 | .90 | .90 | ..... |
| Tin, 100 lb. | 46.00 | 43.00 | 41.50 | 42.00 | 42.00 | 42.00 | —4.00 |
| Tire Scrap | .04¾ | .04¾ | .04¾ | .04¾ | .04¾ | .04¾ | ..... |

### Cartercar Plant To Be Closed

DETROIT, MICH., April 26—Through reliable sources it has been learned that the General Motors Co. will close the Cartercar Co. plant at Pontiac, Mich., with the termination of the present year's output. The closing date has been set for the latter part of May, probably the 22d.

It is the intention to manufacture in the Cartercar plant the new light six which the General Motors organization has now in the process of development. This will use a Northway engine, and will sell under $1,000. It is the intention to manufacture somewhere in the neighborhood of 30,000 of these the first year, providing the parent company can get its organization so far perfected as to make this possible.

No details of the new General Motors six are available at this time, but it is understood that it will be a worthy competitor for the lighter sixes now on the market and selling at around $1,000.

### Ford to Pay Over $15,000,000 in Rebates To Car Buyers

DETROIT, MICH., April 28—Henry Ford's plan of profit-sharing will be carried out this year, according to an announcement by the manufacturer himself. Mr. Ford said yesterday that $50 would be repaid to every buyer of a car in the year following announcement of the plan. The plan called for a rebate upon the purchase price of each car if 300,000 cars were built and sold by the Ford Motor Co. during its fiscal year, August 1, 1914, to August 1, 1915. This production is now assured with a month to spare.

If, as announced in THE AUTOMOBILE for April 22, the production reaches 325,000, the fulfillment of its tentative promise to purchasers will mean the payment of $16,250,000.

### Studebaker Discounting Notes

NEW YORK CITY, April 27—A. R. Erskine, first vice-president and treasurer of the Studebaker Corp., Detroit, Mich., states that the company has, during the past month, used a moderate portion of its cash resources in anticipation of approximately $2,500,000 of the company's outstanding serial notes, maturing $800,000 annually between September, 1915, and March, 1922. The notes were purchased in the open market and cancelled. Of the $8,000,000 of these serial notes originally issued, approximately $5,000,000 have been redeemed.

### Fisk Profits Gain Over $300,000 in 1914

CHICOPEE FALLS, MASS., April 22—The annual report of the Fisk Rubber Co. for the year ended October 31, 1914, just issued shows net profits of $942,204 as compared with $606,001 in 1913. After taking out inventory, adjustment and reserve, amounting to $160,000, the balance for dividends amounts to $782,204, as compared with $488,312 in 1913. This year the first and second preferred dividends amounted to $350,000 as compared with $285,833 the previous year. The surplus amounted to $432,204 as against $202,479 in 1913.

### General Electric 1914 Profits $8,970,963

NEW YORK CITY, April 22—The General Electric Co.'s gross sales in 1914 were $90,467,692 compared with $106,477,439 in 1913. Profits from manufacturing aggregated $8,970,963, against $10,260,605, while the income from other sources brought the total income up to $11,855,383 as against $14,065,789 in 1913.

The net profits amounted to $11,287,827 as compared with $13,489,357 in 1914. The 1915 profits were equal to 11.12 per cent. earned on $101,485,700 capital stock, against 13.2 per cent. earned on $101,381,200 in the previous year. After

paying interest and dividends, the company carried to the surplus account $3,145,061 against $4,908,675 in 1913.

The company increased its manufacturing floorspace by 940,000 square feet during the year, but most of this was under construction when the year began. The expenditures during the year, for additions and improvements to manufacturing plants, aggregated $6,006,955, and the amount written off from the earnings was $4,370,792. The net book value of the company's plants on December 31, 1914 was $31,063,331.

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## Master Carbureter Buys Air Compressor Plant

DETROIT, MICH., April 26—The Master Carbureter Corp., with general offices at Woodward and Hancock avenues, has purchased the real estate and plant of the American Air Compressor Co., 1523 Fort street, west, and will move there early in May.

The structure just purchased is one story high 100 by 225 feet. From 100 to 150 men are to be employed with a view of making 200 to 250 carbureters a day, or about three times the present production.

The Detroit factory will take care of the business all over the country except the west, which is taken care of by the Master Carbureter Co., Inc., of Los Angeles, Cal., which makes an average of fifty instruments a day.

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## U. S. C. C. Discusses Price-Cutting

CHICAGO, ILL., April 23—Price cutting of automobiles and other manufactured articles has been the chief subject of discussion of the committee on the maintenance of re-sale prices of the Chamber of Commerce of the United States of America which has been in session here at the University club and the offices of the chamber. Automobile manufacturers were represented by Henry B. Joy of the Packard company. This committee was appointed in the latter part of 1914 and made a preliminary report at the convention of the chamber in Washington on February 5 of this year. The convention at that time instructed the committee to investigate the elements of price maintenance problem and stated in such a way that these statements could be made the basis of a referendum or general vote of the organization members of the National Chamber.

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## March Exports 3,767 Motor Vehicles

WASHINGTON, D. C., April 28—*Special Telegram*—Exports for March show that 1,339 commercial vehicles valued at $4,723,563 and 2,428 passenger cars valued at $1,958,302 were shipped to Europe. For the 9 months ending with March, commercial vehicle exports were 6,313 valued at $18,737,487. Passenger cars numbered 11,562 valued at $9,555,751.

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YOUNGSTOWN, O., April 23—The present stockholders of the Youngstown Sheet & Tube Co. have taken practically the entire $5,000,000 issue of the new stock authorized several weeks ago.

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## Dividends Declared

The following dividends have been declared: Stewart-Warner Speedometer Corp., Chicago, Ill., quarterly dividends of 1 1-2 per cent. on common and 1 3-4 per cent. on preferred, payable May 1 to stock of record April 26.

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DETROIT, MICH., April 26—S. H. Humphrey, factory manager of the Hupp Motor Car Co., for the last 2 1-2 years, has resigned to become works manager of the Chalmers Motor Co., July 1. He succeeds H. H. Pinney, third vice-president and works manager of the Chalmers company during the last few years.

A successor to Mr. Humphrey has not yet been appointed.

# Automobile Securities Quotations

NEW YORK CITY, April 26—War talk and rumors had a direct influence on the securities market this week. Prices were lower and the gains were few and small. A few of the most important changes are as follows: Packard common and preferred 15 and 4 points higher respectively; General Motors common, 9 points and preferred 1 1-2 points higher, and J. I. Case preferred, 2 points higher.

Changes in the tire prices were mostly declines. Goodrich preferred dropped 1-2 point; Goodyear preferred went down 1-2 point; Kelly-Springfield common and second preferred both went down 4 points; Miller Rubber common declined 5 points and Swinehart stock, down 10 points.

There were a few small drops in the accessories securities as follows: Stewart-Warner common and preferred, 1 point; and Texas company stock, 5 points.

Quotations in the Detroit exchange were slightly higher. The following stocks showed gains; Chalmers common 3-4 points and preferred, 2 points; Continental Motor common and preferred, 2 1-2 and 2 points, respectively; Packard common and preferred, 23 and 5 1-4 points, respectively; Studebaker common, 1 point. In the inactive stocks, Kelsey Wheel went up 5 points.

| | 1914 Bid | 1914 Asked | 1915 Bid | 1915 Asked | Wk's Ch'ges |
|---|---|---|---|---|---|
| Ajax-Grieb Rubber Co. com | 200 | .. | 285 | .. | .. |
| Ajax-Grieb Rubber Co. pfd | 98 | 102 | 100 | .. | .. |
| Aluminum Castings pfd | 98 | 100 | 98 | 100 | .. |
| J. I. Case pfd | 80 | 82½ | 80 | 87 | +2 |
| Chalmers Motor Company com | .. | 82 | 93 | 98 | .. |
| Chalmers Motor Company pfd | .. | 90 | 92 | 94 | .. |
| Electric Storage Battery Co | 49 | 50 | .. | .. | .. |
| Firestone Tire & Rubber Co. com | 284 | 290 | 455 | 460 | .. |
| Firestone Tire & Rubber Co. pfd | 107 | 109 | 110 | 112½ | .. |
| General Motors Company com | 74½ | 75½ | 145 | 147 | +9 |
| General Motors Company pfd | 89½ | 90½ | 100½ | 102 | +1½ |
| B. F. Goodrich Company com | 24½ | 25½ | 48 | 49 | +2 |
| B. F. Goodrich Company pfd | 86 | 89 | 101 | 102 | — ½ |
| Goodyear Tire & Rubber Co. com | 168 | 173 | 239 | 240 | +1 |
| Goodyear Tire & Rubber Co pfd | 95 | 96½ | 104 | 105 | — ½ |
| Gray & Davis, Inc., pfd | 90 | 97 | .. | .. | .. |
| International Motor Co. com | .. | 5 | 15¾ | 16 | —1¾ |
| International Motor Co. pfd | .. | 15 | 31½ | 32 | — ½ |
| Kelly-Springfield Tire Co. com | .. | .. | 130 | 132 | —4 |
| Kelly-Springfield Tire Co. 1st pfd | .. | .. | 84 | 85 | .. |
| Kelly-Springfield Tire Co. 2nd pfd | .. | .. | 130 | 140 | —4 |
| Maxwell Motor Company com | 8 | 8½ | 49 | 51 | +2 |
| Maxwell Motor Company 1st pfd | 34 | 35 | 81½ | 83 | + ½ |
| Maxwell Motor Company 2nd pfd | 12¼ | 13 | 38 | 40 | + ½ |
| Miller Rubber Company com | .. | .. | 180 | 188 | —5 |
| Miller Rubber Company pfd | .. | .. | 104 | 105 | +3 |
| New Departure Mfg. Co. com | 122 | 124 | 137 | 138 | .. |
| New Departure Mfg. Co. pfd | 105½ | 107 | 106 | 110 | .. |
| Packard Motor Car Co. com | 103 | .. | 101 | .. | +15 |
| Packard Motor Car Co. pfd | 94 | 98 | 97 | .. | +4 |
| Peerless Motor Car Co. com | 15 | .. | 20 | 21 | .. |
| Peerless Motor Car Co. pfd | .. | 75 | .. | 55 | .. |
| Portage Rubber Co. com | .. | 25 | 35 | 38 | +1 |
| Portage Rubber Co. pfd | .. | 75 | 85 | 88 | .. |
| Reo Motor Truck Company | 7⅛ | 8½ | 14¾ | 15⅛ | .. |
| Reo Motor Car Company | 19½ | 20¾ | 32¾ | 33¼ | — ¾ |
| Splitdorf Electric Co. pfd | 40 | 50 | .. | .. | .. |
| Stewart-Warner Speed. Corp. com | 50 | 54 | 67 | 69 | —1 |
| Stewart-Warner Speed. Corp. pfd | 99 | 101 | 102 | 104 | —1 |
| Studebaker Corporation com | 26½ | 27½ | 66 | 68 | +3 |
| Studebaker Corporation pfd | 82½ | 83½ | 100 | 102 | +1 |
| Swinehart Tire & Rubber Co | 60 | 65 | 80 | 90 | —10 |
| Texas Company | 139 | 140 | 137 | 139 | —5 |
| U. S. Rubber Co. com | 53½ | 54½ | 69 | 71 | .. |
| U. S. Rubber Co. pfd | 99½ | 100½ | 106½ | 108 | — ½ |
| Vacuum Oil Company | 215 | 220 | 209 | 212 | +1 |
| White Company pfd | 97 | 100 | 103 | 108 | .. |
| Willys-Overland Co. com | 60½ | 62½ | 118 | 120 | —7 |
| Willys-Overland Co pfd | 88 | 90 | 100½ | 102 | + ½ |

### OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS.

| | | | | | |
|---|---|---|---|---|---|
| Chalmers Motor Co. com | .. | 83 | 92 | 95 | + ¾ |
| Chalmers Motor Co. pfd | 88½ | 91 | 95 | 98 | +2 |
| Continental Motor Co. com | 150 | .. | 177½ | 187½ | +2½ |
| Continental Motor Co. pfd | .. | 80 | 82 | 85½ | +2 |
| General Motors Co. com | 74 | 76 | 144 | 146 | +1 |
| General Motors Co. pfd | 90 | 92 | 100 | 102 | —1 |
| Maxwell Motor Co. com | 8 | 9 | 47½ | 49 | —3½ |
| Maxwell Motor Co. 1st pfd | 34 | 35 | 81 | .. | —1 |
| Maxwell Motor Co. 2nd pfd | 12 | 13 | 37 | 39 | —1½ |
| Packard Motor Car Co. com | 103 | .. | 103 | 110 | +23 |
| Packard Motor Car Co. pfd | 94 | 98 | 99 | .. | +5¼ |
| *Reo Motor Car Co | 20¾ | 21¾ | 32½ | 33½ | — ¼ |
| *Reo Motor Truck Co | 8⅝ | 9¼ | 14½ | 15¼ | + ¼ |
| Studebaker Corp. com | .. | .. | 66 | 68 | +1 |
| Studebaker Corp. pfd | .. | .. | 99 | 101 | .. |

INACTIVE STOCKS.

| | | | | | |
|---|---|---|---|---|---|
| *Atlas Drop Forge Co | .. | 21 | .. | 26 | .. |
| Ford Motor Co. of Canada | .. | 560 | 660 | .. | .. |
| Kelsey Wheel Co | 190 | 200 | 195 | .. | +5 |
| *W. K. Prudden Co | .. | 21 | .. | 21 | .. |
| Regal Motor Car Co. pfd | .. | 40 | 12 | 20 | .. |

BONDS.

| | | | | | |
|---|---|---|---|---|---|
| General Motors, notes, 6s, 1915 | .. | .. | .. | .. | .. |
| Packard Motor Co. 5s, 1916 | .. | .. | .. | .. | .. |

*Par value $10; all others $100 par value.

# Wheel Tax Declared Invalid

## Illinois Supreme Court Decision Hits Chicago Financial Blow—Nearly $500,000 Lost for 1915

CHICAGO, ILL., April 22—As a result of a decision handed down by the Supreme Court in Springfield, Ill., yesterday, motorists of Chicago will not be compelled to pay a wheel tax to the Municipal authorities hereafter, in addition to a fee for license and registration to the state treasury.

In the test case brought by Joseph Dehner against the City of Lincoln, Ill., the Supreme Court decided that the wheel tax was invalid. Judge Craig, who handed down the decision held that the annual license fee which motor car owners are required to pay to the state is a tax, and that double taxation exists when motorists are required to pay a municipal tax also. This was the contention of the attorneys of the Lincoln resident, who sought to have the city ordinance there declared unconstitutional.

The decision of the Supreme Court struck the city of Chicago a terrific financial blow; it means that Chicago is to be deprived of at least two-thirds of an annual income which reached $726,129 for 1914, and which has been climbing so steadily, it was expected to reach the $1,000,000 mark within a short time. During the last five years, Chicago has collected $3,146,218.88, from this source of revenue, divided as follows:

| | | | |
|---|---|---|---|
| 1910 | $560,213.03 | 1913 | $676,961.47 |
| 1911 | 586,157.46 | 1914 | 726,129.05 |
| 1912 | 596,757.87 | | |

The opinion applies to passenger vehicles alone, and does not declare invalid the state wheel tax law. Motor trucks, and horse drawn vehicles are not mentioned in the decision, and apparently are not affected. Dehner refused to pay a wheel tax imposed by the ordinance, and was fined $25 by a local Justice of the Peace. The Circuit Court reversed the decision. The case was then taken to the Supreme Court and the action of the lower tribunal was sustained.

In sustaining the action of the lower court, however, the Supreme Court says: "The ordinance in question is in square conflict with Section 12 of Motor Vehicle Action of 1911, which prohibits the imposition of local licenses on vehicles of certain types. The ordinance in question is against both spirit and letter of the law."

As the result of this decision, Chicago will be deprived of more than $500,000 annual revenue, which has been used to pay the expenses of street repairs, and hundreds of men will be thrown out of work in the street repair department until provision can be found for an appropriation to carry on this work. City officials believe that Chicago has received a knock-out blow as the result of the Supreme Court decision on the wheel tax law.

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### New Plates Every 3 Years in Iowa

DES MOINES, IA., April 22.—The thirty-sixth general assembly of Iowa has just ended its session with a record of legislation on good roads and motor vehicles which is popular among the motorists and good roads enthusiasts of the state.

Changes in the law governing the registration of automobiles are especially approved by motorists. The new law provides that number plates shall be issued only every 3 years instead of every year as at present. This will save the motorists the annual worry over new number plates. The fees shall be a lien upon the motor vehicles and penalties shall be collected for delinquency. Under the new law the plates may be made at state institutions. The new law provides also that the state automobile department shall charge 50 cents, instead of $1 as at present, for extra number plates. All new provisions will go into effect July 1, 1915.

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### 35 Cents Per H.P. for California

SACRAMENTO, CAL., April 23—The Mouser bill regulating automobile taxation was passed by the assembly during the second week of this month. The bill aims to change the system of licensing and registration. It imposes a registration fee of 35 cents per horsepower on all automobiles, a graduated license scale for commercial vehicles and a $5 fee for all electric vehicles not used for commercial purposes.

The bill differs from the one introduced by Senator Birdsall in March and which passed the senate this week, in the matter of rating. This bill requires the payment of 40 cents per horsepower. Among its features are: license plates need not be changed each year, but a small disk will be attached indicating the year; speeders on a second conviction shall lose their licenses for 6 months; S. A. E. formula for rating horsepower; tax on commercial vehicles changed so that they are rated according to weight of the unloaded car, ranging from $5 up to 4,000 pounds to $20 for 8,000 or more pounds; and all automobiles formerly exempted from license fees, except Federal-owned cars, are included under the tax.

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### Ohio Halves Dealers' License Fees

COLUMBUS, O., April 24—The bill reducing automobile dealers' licenses from $20 to $10 has been passed by both houses of the assembly and is now up to Governor Willis for signature. Little opposition was offered to the bill, which was supported by automobile clubs and the Ohio Automobile Assn.

The senate unanimously passed the bill providing for the transfer of license tags from one car to another, by the same owner, by making a payment of $1 for re-registration.

A bill was introduced in the senate last week providing that headlights on automobiles shall not shine higher than 3 feet from the roadway for a distance of 75 feet in front of the car. Steps were taken at once to kill the measure before it got to the floor of the senate. In the bill, the question of judgment was left entirely to the justice of the peace, the mayor or other peace officer before whom the charge was brought.

Practically all cities in the state have dimming ordinances, and motorists generally do not believe it is wise to enact a dimming law to cover the highways of the state.

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# N. Y. May Tax Trucks More

ALBANY, N. Y., April 24—Hereafter motor trucks will have to pay the same registration fee in this state as passenger cars, provided Governor Whitman signs the Hewitt bill which passed the legislature today. The fee up to 25 horsepower is $5 and from 25 to 35 horsepower, $10.

Motorcycles, heretofore not taxed, must pay a fee of $2.

There also was little opposition to the Sullivan bill which provides that, regardless of the age of the car, the same fee must be paid. Heretofore cars 4 years old have been given a half rate.

The Sullivan-Hewitt bill, which would have doubled the fee on passenger cars, was killed through the efforts of the Automobile Trade Assn. of New York State.

On April 21 the Wicks bill was passed through the legislature. This measure provides that all vehicles shall carry lights from 1 hour after sunset to 1 hour before sunrise and is a law that will aid materially in reducing the number of accidents. The bill will become effective July 1 and will force all vehicles to carry lights or subject the offender to a fine of $10 upon arrest by police officers in any part of the state. New York City is not affected, however.

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DETROIT, MICH., April 21—Giving its liabilities as worth $329,650.71 and its assets as worth $422,391.13 the Detroit Body Co., has filed a voluntary petition in bankruptcy. The principal creditor is the First and Old Detroit National Bank, which hold claims totaling $170,679.81. The company's real estate is listed at $167,520.86 and the machinery and equipment at $91,308.81. Last March Judge Arthur Tuttle, of the United States federal court, declared the concern bankrupt, following an involuntary petition filed by the Russell Wheel & Foundry Co., Detroit, and other creditors.

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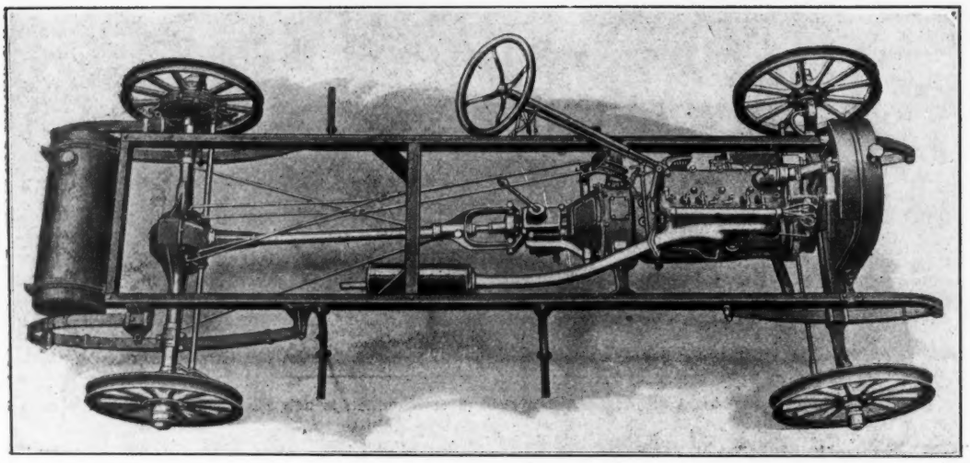
### Hercules Touring Car and Roadster on Market

LOUISVILLE, KY., April 24—The Hercules five-passenger touring car, $595, with Federal electric starter, $55 extra, and a roadster at the same price, are now being built by the Kentucky Wagon Mfg. Co., makers of the Urban and Old Hickory trucks. A town-car, details of which have not yet been announced, will be placed on the market next fall. The touring car formerly sold for $550 but a number of refine-

ments and improvements, including the lengthening of the wheelbase from 104 to 110 inches and the addition of a gasoline tank at rear have been made.

The body is of clean design. Regular equipment includes electric lights, a clear and rain vision windshield, easy folding top, quick acting curtains, speedometer, electric horn, pump, jack, tire repair outfit, tools and tire irons.

The car has a four-cylinder Lycoming motor with inclosed valves, the cylinders being block cast, the bore is 3 1-4 inches and the stroke, 5; a leather-faced cone clutch is used; gear ratio, 4 1-4 to 1; force feed and splash oiling system with sight feed on dash; unit power plant; thermo-syphon cooling; honeycomb radiator; float feed and jet type carburetion. Gasoline feed is by Stewart vacuum system.



Plan view of Hercules chassis, built by the Kentucky Wagon Mfg. Co.

The tires are 30 by 3 1-2 non-skid on the rear; 31 by 4 tires are extra as are demountable rims. The front axle is of solid drop forged I-beam; the rear axle is floating.

While the Kentucky Wagon Mfg. Co. has a contract to manufacture Hercules cars, the Hercules Sales Co. controls the selling rights.

This concern was organized last January with a capital stock of $100,000. Officers of the company are: A. H. Ross, Louisville, president, Charles Kelso, New Albany, vice-president; C. L. Caron, secretary and treasurer. Four hundred agents are now being supplied with demonstrators.

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## Weber Is Maxwell Assistant Manager

DETROIT, MICH., April 27—Orlando Weber, who has been in the automobile industry since its inception, has joined the Maxwell Motor Co. as assistant manager, in which capacity he will carry much of the responsibilities of active management, relieving Walter E. Flanders, president and general manager, of a great deal of the burden of the company's affairs. He will devote considerable of his time to the sales end of the business.

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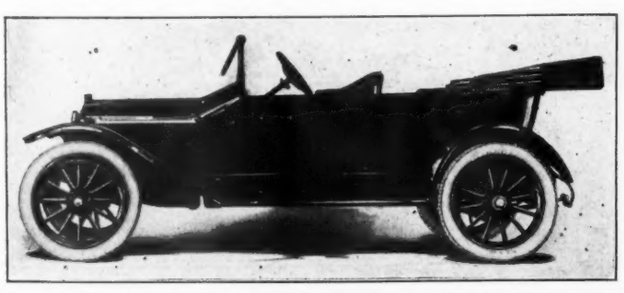
## Monitor to Concentrate on Four-Cylinder

COLUMBUS, O., April 26—The Cummins Auto Sales Co., this city, formerly central Ohio agent for the Krit, has made the final announcement of the specifications for the new Monitor which is to be manufactured by the company. The plans are to drop the manufacture of the eight-cylinder car and to devote all of the attention of the firm to the four-cylinder car. There will be one chassis with two bodies, a touring car and a runabout.

The Monitor 4-30, as the car will be known, is built on a 108-inch wheelbase chassis. The car will be completely equipped with electric lights and starter and will sell for $795 for the touring body.

The motor will have a bore of 3 3-4 inches and a stroke of 4 1-4 inches. It will be manufactured by Golden, Belknap & Swartz. The cylinders are bloc cast, with removable head. Lubrication is by force feed to main bearings, splash system being used for balance of lubrication. Water circulation is by thermo-syphon with 2-inch pipes. The motor is a unit power plant with multiple-disk clutch and center control. Transmission is of the selective type, sliding gear. For ignition the Splitdorf high-tension magneto is used. A 12-volt Disco electric generator and motor is used for starting and lighting. Semi-elliptical springs are used in front and special type springs in the rear.



New Hercules five-passenger touring car, selling at $595

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NEW YORK CITY, Aprl 26—The Hercules Instrument Co., Inc., Mount Vernon, N. Y. has acquired from the Benford Mfg. Co. of that city the sole rights to manufacture and sell the Monarch indestructible ammeter, and also all patent rights. In addition to marketing the Monarch ammeter, the new company is also placing on the market an indestructible voltmeter and an indestructible storage battery tester.

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INDIANAPOLIS, IND., April 24—Cecil E. Gibson, president of the new $500,000 Madison Motors Co., Anderson, Ind., has appointed E. D. Hand, Detroit, Mich., who has been connected with the sales departments of two or three well-known automobile companies. W. E. Moore, at one time one of the production experts at the Ford Motor Co., has been selected as factory manager. G. S. Sarber will be assistant secretary and O. S. Beroth, formerly of the Hudson and Rutenber companies, will have charge of the service department.

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DETROIT, MICH., April 27—Alfred Thompson, who for about 2 years was works manager for the Maxwell Motor Co., has become identified with the production department of the Hudson Motor Car Co. and will act in an advisory capacity as a machine expert. This move will not conflict with the efficent service of the Hudson company production management under W. J. McAneeny. Thompson first became identified with the automobile industry as general manager of the Pope-Toledo Mfg. Co. Since then he has been works manager of the Rutenber Motor Co., Marion, Ind. Geo. W. Smith is now works manager of the Maxwell company, having served as assistant to Thompson prior to the latter's change.

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## Timken Plants To Be Greatly Enlarged

DETROIT, MICH., April 24—Ground is about to be broken for a new forge shop and power plant for the Timken-Detroit Axle Co. This will double the present capacity of the concern for drop forgings, etc.

The site of the new buildings is approximately 1,000 feet long, facing the present plants and on the opposite side of the street, while it is about 500 feet deep, and it is probable that the entire space will be filled with the buildings.

Then too, Timken-David Brown facilities are to be increased to about double their present capacity on worm gear making when a building now under way and three stories in height of brick is completed. This was begun earlier and is in addition to the expansion already mentioned. The axle output is about 250 sets of standard Timken front and rear axles a day, and fifty sets of the Timken-David Brown worm type. The additions now under consideration involve $750,000.

At work on the Chicago speedway at Burnside, which is being built for the 500-mile race to be held June 19

# Work Begins on Chicago Speedway

## 200 Feet of the 2-Mile Board Track Now Ready for Final Planking—Fourteen Entries

CHICAGO, ILL., April 24—After many weeks of uncertainty as to the fate of the Chicago Speedway and the 500-mile race set for June 19, it jumped from a project on paper to an actuality in the past 3 days. Active work on the construction of the track at Burnside, a suburb, began Tuesday. Two hundred feet of the 2-mile board track is now ready for the final top coat of 2 by 4 planking, which will be in place before Sunday. Preliminary grading for the four subways, one at each corner of the track, is under way and the building of roads is progressing.

250 men are at work. Next Monday work on the track will be continuous, as three 8-hour shifts will be at work so there will not be an hour's cessation, night or day, until June 5, at which date, Contest Director F. E. Edwards expects to have the track ready for practice.

The 230-acre tract is level as a floor, so that no grading is necessary, except for the four subways which will give access to the infield—there will be no crossing of the track. The construction of the latter is of wood throughout, except for the concrete footings. Upon these are set 12 by 18-inch sleepers lengthwise of the track. The sleepers carry 2 by 12-inch beams placed radially and the top surface is of 2 by 4-inch lumber lengthways of the track. The width is 56 feet on the straightaways, except the home-stretch, which is 66 feet, and 75 feet on the turns. The track is to be banked on the turns for speeds up to 95 miles an hour or better. The grandstands will seat between 45,000 and 50,000 spectators.

Starting of the work was delayed by financial difficulties and a disagreement with the original contractor. Both these difficulties have been overcome, the first by the negotiation this week of a $300,000 loan and the latter by arrangement with a new contractor who is pushing the work with remarkable speed, now that it is actually started.

Fourteen entries have been received for the June 19 meet of 500 miles for the purse of $54,000 offered by the speedway. These entries include two Sunbeams, two Duesenbergs, three Maxwells, Ralph DePalma in the Patterson Mercedes and John DePalma in the Delage, three Stutz, with Gil Anderson and Earl Cooper as two drivers, Barney Oldfield's Bugatti and Burman's Peugeot.

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# Oklahoma Winner Had Many Handicaps

OKLAHOMA CITY, OKLA, April 26—As reported in THE AUTOMOBILE last week, an Overland driven by Claude Foster won the 99-mile Oklahoma race on Tuesday, April 20, driving the car in the shape in which it left the factory, except for the fact that the fan was removed.

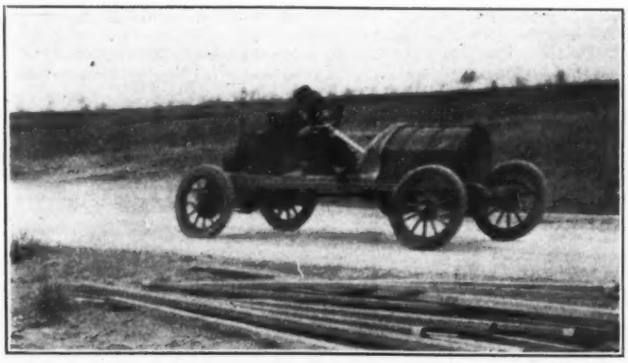
Foster made the 99 miles in 2:02:03 1-2. He made the run in spite of handicaps of the worst kind. The first accident to his car was when a bolt on his oil tank worked loose and was lost. This he overcame for a time by having his mechanic hold the tank on. Next the number four car in the race threw a tire, causing the Overland to slow down to 10 miles per hour, losing thereby the lead it had taken over other cars. Then the driver was forced to stop his car to take off the faulty oil tank and to put more oil in his engine, losing at least one lap in that way. The throttle stuck, causing a slow down, almost equal to a stop and then to cap the climax the foot throttle broke on the next lap, which forced Foster to use the hand throttle and to drive the car with one hand for the last five laps.

The radiator tank was not refilled during the race, and according to both Foster and his mechanician, the water was not boiling at the finish.

The winners of the 99-mile race, for the $1,000 purse, were as follows:

| Car | Driver | Time |
|---|---|---|
| Overland | Claude Foster | 2:02:03 1-2 |
| Hupmobile | R. W. Thomas | 2:02:34 |
| Studebaker | C. Shaffstall | 2:05:05 |
| Buick | C. B. Chandler | Not taken |

R. W. Thomas of Enid finished in second place just 30 minutes behind the winner. Throughout the entire race, he did not make a single stop. The Studebaker, driven by C. Shaffstall, was third and the fourth share of the $1,000 purse went to C. B. Chandler, who piloted a Buick. Of the nine cars which started in the race, all except two were running when the starter's flag closed the race. The Knox jumped the course, struck a tree and was wrecked at the Willard hook in the second lap. The Wallace special developed motor trouble in the third lap, limped to its pit and after seventeen laps while mechanics worked on it, started again, only to come to grief and go down for the count near the wreck of the Knox. Save for bruises to Mechan-



Claude Foster in the Overland which won the 99-mile race at Oklahoma City

ician Haibe of the Knox, none of the four riders in the ill fated cars were injured.

Drawing the inside of the front rank at the start, Buick No. 2, piloted by J. H. Strickler of Enid spurted to the lead and gradually increased its margin up to the ninth lap when magneto trouble slowed it up and caused it to lay aside for six laps. Prior to this mishap, and for the twenty-six laps after the car got back into the race, Mechanician George Frey covered with his hand a leak in the gas tank.

On the fourth lap, Strickler made the best time for one lap in the race, covering the 2.409 miles course in 2 minutes, 33 1-3 seconds. When the Buick No. 2 went to the bad, M. J. Main, Jr., picked up the lead with his Mercer. In the fifteenth lap he was forced to lay out while the others gained a half dozen rounds, the Overland running in front.

The Overland surrendered the lead in the twenty-fifth lap when it stopped at the pit for 2 minutes, having lost an oil tank, and the Hupmobile claimed first honors. The Overland went into the lead again in the last few miles, increasing its advantages when both the Hupmobile and the Studebaker lost time on the curves.

## Oklahoma Race for April 29

OKLAHOMA CITY, OKLA., April 26—Special Telegram—Owing to continued rains and the bad condition of the 4-mile road race course in this city the 200-mile race which was to have been run as a postponed date on Sunday, April 25, has again been postponed until Thursday, April 29.

## 17 Entries So Far for Indianapolis

INDIANAPOLIS, IND., April 26—Two Bergdoll cars have been added to the Indianapolis 500-mile race field of entries, making the total list to date amount to nineteen. Erwin Bergdoll of Philadelphia, Pa., is sponsor for the cars, one of which he expects to drive himself, with his brother Grover Bergdoll at the wheel of the other.

J. Porporato, a Spanish driver, has been named as alternate driver on the Sunbeam team in the event that either Louis Coatalen or Chassagne, the present candidates, are unable to get away.

Howdy Wilcox, runner-up in the recent Vanderbilt and Grand Prize races, in one of the new 300-inch Stutz cars, reeled off a lap in 1:36:4, or better than 93 miles an hour in a time trial at the Indianapolis Motor Speedway in Indianapolis this week.

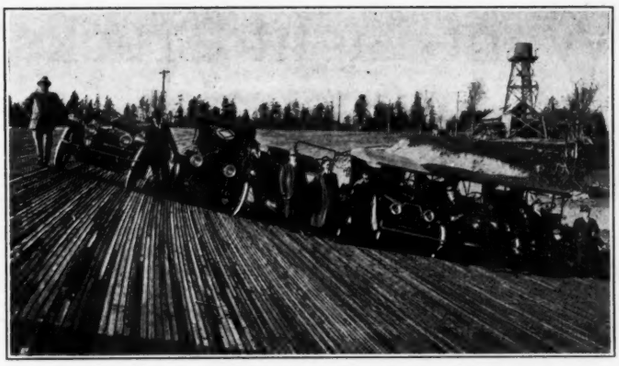
Gil Anderson next took the same car and did 50 miles in 34:27, or 87.1 miles an hour, without a sign of trouble.

This performance has caused America's stock in the next 500-mile race to go up materially and for an early season performance it is regarded as remarkable by local automobile men. More trials will be held soon. Entries to date are as follows:

| Car | Drivers | Probable Drivers |
|---|---|---|
| Maxwell | Carlson | |
| Maxwell | | Rickenbacher |
| Maxwell | | |
| Stutz | | Anderson |
| Stutz | | Wilcox |
| Stutz | | Cooper |
| Sunbeam | Chassagne | |
| Sunbeam | Coatalen | |
| Peugeot | Resta | |
| Peugeot | Burman | |
| Peugeot | | Duray |
| Delage | J. De Palma | |
| Mercedes | R. De Palma | |
| Duesenberg | Alley | |
| Duesenberg | O'Donnell | |
| Du Chesneau | Brown | |
| Cornelian | Chevrolet | |
| Bergdoll | | E. Bergdoll |
| Bergdoll | | G. Bergdoll |
| F.R.P. (Porter-Knights) | | Hughes |
| F.R.P. (Porter-Knights) | | Whalen |
| F.R.P. (Porter-Knights) | | Keene |
| **Expected Entries** | | |
| Mercer | | Pullen |
| Mercer | | Ruckstell |
| Mercer | | |
| Bugatti | | Oldfield |
| Mulford | | Mulford |
| King | | A. Klein |
| Sunbeam | | Grant |
| Cornelian | | C. Klein |
| Ft. Worth | | Clarke |
| Cino | | McCord |
| Duesenberg | | Thomas |

## May Combine Two Big Desert Races

LOS ANGELES, CAL., April 22—The 1915 Phoenix road race will be a 5-day desert dash for a $20,000 purse, if the plans of enthusiastic Los Angeles automobile men and sportsmen carry through. It is the intention of the desert race votaries, to combine the Los Angeles to Phoenix and the El Paso to Phoenix races.



Celebrating the completion of the board portion of the Tacoma speedway, built by the Tacoma Speedway Assn., Tacoma, Wash.

The proposed route is over the National Old Trails route, or the Santa Fe-Grand Canyon-Needles National highway, to Ash Fork Junction, then south through Prescott to Phoenix and over the Borderland route through Tucson, Tombstone, Bisbee, Douglas, Lordsburg and Deming to El Paso, Tex. There are to be four night controls; at Needles, Prescott, Phoenix and Tucson.

This proposed course would measure approximately 1,200 miles. The distance from Los Angeles to Phoenix, over the northern route, the course of the desert classic in 1914, is 671 miles and it is practically 525 miles from Phoenix to El Paso over the Borderland route. This would be the longest automobile race ever held and would come under the head of a semi-transcontinental event.

It is also proposed to hold the race at an earlier date than formerly. The first week in November has always been the time set for the desert classic but the supporters of the event claim that it should be moved up 3 weeks or a month.

The $20,000 purse is to be cut eight ways. The winner is to receive $8,000 according to the plans of the supporters of the race. The second place man is to receive $5,000, $3,000 is to go to third, $1,500 to fourth, fifth place is to net $1,000, $750 is to go to sixth place winner, $500 to the seventh man and $250 for the eighth place.

## Entries for Tacoma Speedway Events

TACOMA, WASH., April 22—Although the running of Tacoma's 1915 speedway events is still 3 months off, the following entries are registered at the office of the Tacoma Speedway Assn.: Robert Burman, Peugeot; G. Ruckstell, Mercer; Eddie Pullen, Mercer; Dave Lewis, Stutz; Earl Cooper, Stutz; J. Parsons, Parsons Special; and Joe Thomas, Mercer.

The Montamarathon classic, the 250-mile event, will be run on Sunday afternoon, July 4, while the Inter-City century and the Potlatch trophy events will be run on Monday, July 5.

NEW YORK CITY, April 23—An intercollegiate transcontinental automobile race has been planned for next summer by the Eastern College Newspaper Assn., according to an announcement made at Columbia University yesterday. Cars from every college and university in the country will compete. The start is scheduled to be made about July 1 and stops will be made at the Panama-Pacific Fair.

The race is planned more as an endurance test for the college drivers and their cars rather than as a speed test. Any make of a car will be permitted.

## Small Attendance at Exposition Exhibits

SAN FRANCISCO, CAL., April 18—Yesterday was one of the big attendance days at the Exposition here, but the attendance in the automobile exhibits was small, averaging less than three visitors per exhibit in the afternoon. In the British section the Rolls-Royce is exhibited. There are also displays by not a few American concerns such as Champion Spark Plug Co., Splitdorf Electrical Co., American Ever Ready Co., Wisconsin Motor Mfg. Co., Standard Oil Co., and a few others.

The exhibits of trucks is very small, but there is a motor truck building being erected at a stub-end of the grounds where it will be difficult for people to find it.

# Want Light Trucks in Australia

## Conditions in Automobile Industry Are Better — Many Fields Open

SYDNEY, AUSTRALIA, March 24—Automobile conditions are improving in this country. On December 31, 663 motor trucks were registered in New South Wales and 690 in Victoria, this showing a big improvement over one year ago. The light truck market is going to be a big one in Australia, and if dealers had hundreds of these trucks on hand today they could readily dispose of them. Quite recently business houses wanting light trucks were purchasing passenger touring car chassis and fitting them for light delivery work. While these have been successful in their light capacity something stronger has been wanting and the light truck is fulfilling this demand.

Owing to the British government commandeering the whole of the British output of trucks there is now a dearth in Australia of light motor trucks. No one has any on hand and no one can procure any from England. Importers are somewhat anxious and are hesitating whether to dabble in American light trucks or not; a few of them are now coming into the country and are beginning to sell. Light trucks up to 2-ton capacity are the type most of our business houses require.

### Mail Service Offers Field

Another big field for the truck is the country mail service. Railroads are very scarce in Australia and from each railway town mail contracts are let to carrying firms, quite a few of whom already own motor cars for the heavy class of work. This service requires something stronger and slightly slower than the average passenger car and the light truck should fill these requirements.

The Australian postal department is very much in arrears in motor delivery. It has a few vehicles running between Melbourne and Adelaide, but the other cities are cared for by horses and the want of a light truck is staring them in the face today.

Other businesses such as piano houses, typewriter concerns, etc., are using motor trucks. Brewers are the greatest buyers today. Retail firms such as butchers and grocers are taking motor trucks very slowly.

In the big cities the catering business is controlled by a few large concerns who have depots all over the place. These depots are supplied from one huge factory located in a suitable district, and the question of delivery is the only thing that is troubling them today. In Sydney and Melbourne alone one concern is on the eve of placing the largest order yet placed in Australia for trucks, outside the government. This firm feeds more people than any other five concerns in Australia, and declares that inside a year it will not own a horse. If it had 100 trucks it would not have enough. At present it has five, but is launching out now in large numbers.

At the present time horses are scarce, owing to the war demands, and horse feed is very high in price through the drought and its consequences. These mail contractors are commencing to inquire into the utility of motor trucks, and a number of sales are expected in this direction.

Cattle is commanding record prices and so is wool. Wool has never been sold at higher prices than it has commanded lately; the demand comes from the seat of the war. With these prices it makes the automobile business very busy and very prosperous—the automobile only interests people with money, and it is monied people today that are making money. Unfortunately, the poorer classes are worse off than ever. War seems to be making extremes in this country and while the wealthy have plenty of money they will spend it in automobiles. Next year should be a record year, though the whole of the prosperity of Australasia depends on rain.

### Nebraska Registrations Pour In—Sales Boom

OMAHA, NEB., April 27—Prosperity in this territory in the automobile business has been so great that dealers on every hand report such enormous increases in their trade that it is impossible for them to keep pace with the demand for their cars.

A year ago the total automobile registrations with the secretary of state at Lincoln reached 40,258. In 1913 the total registrations were only 25,616. Both were exclusive of motorcycles.

The registrations for the first quarter of 1915, under a new law which requires a change of motor tag number colors each year, have reached 15,000. Applications for license numbers are literally pouring into the office of the secretary of state. One morning's mail brought requests from 515 owners.

And still, it is believed, an old motor registration law, with its loose provisions, is working an injustice on the state. Licenses still are being used which were issued many years ago when no fee was required. They are obsolete, but their owners have not come up to scratch with the money for new numbers.

There is not a dealer in this city who doesn't report an increase in his business which varies from 60 to 100 per cent. The great trouble now is to supply the demand for machines. No sooner is one received on the salesroom floor, the dealers say, than it is grabbed up by some anxious purchaser.

If this sort of thing keeps up it is conceded that several millions of dollars in business will be handled through this point before the year is half over.

CHICAGO, ILL., April 23—The Inland Steel Co. has closed a contract with one of the largest gunpowder manufacturing concerns in the United States for its entire output of benzol for the next 2 years, which is expected to net the company a profit of about $2,000,000.

# Prosperity Wave Hits Detroit Accessory Makers

(*Continued from page* 751)

some forty concerns on the company's books, and lots of business in sight. Expansion at the Long plants is the rule, for at this time they are building 5,000 feet more floorspace for enamelling ovens and general manufacturing.

The windshield branch of the trade is well represented in the present operations of the Vanguard Mfg. Co., which at this time is turning out over 1,000 windshields a day, with every manufacturer it is supplying increasing his specifications. Business is said to be fully one-third better than a year ago, and night and day shifts have been in vogue since some 5 or 6 weeks ago. Another means of comparison is in the fact that at this time there are about 300 men on the Vanguard payroll as against 165 in April of 1914. Here again, the statement was made that business looks better than it has for a year past.

### Zenith 50 Per Cent. Gain

Last week the Zenith Carbureter Co. put on a night shift in an effort to keep pace with manufacturers' demands. This shift works 12 hours. Business has increased fully 50 per cent. in Zenith carbureters in the last half year. The Zenith factory is an example of modern factory construction, and was built large enough to take care of just such expansion as is now taking place. New machinery is being added in an effort to raise the output of 200 carbureters a day. Ninety men are now on the payroll.

The output of the Bower Roller Bearing Co. has been double that of last year, in order to fill its orders. Many departments are running overtime, and part of the production division is operating at night. The present number of employees is 125, which is about 40 per cent. more than the concern required at this time 1 year back. Bower bearings are now being supplied to seventy car makers.

The Massnick-Phipps Co., maker of the Perkins motors, has within the last year become one of Detroit's very active manufacturers. It foresaw the wave of popularity of the eight, and was quick to place one in the field. Now fully 75 per cent. of the daily output of thirty-

two engines a day is of the eight-cylinder type. This production is 100 per cent. more than the concern enjoyed last year.

Not very long ago, Massnick-Phipps took over the plant formerly occupied by the Wahl Motor Car Co. which gives 25,000 square feet additional, making a total of 60,000 square feet. W. A. Perkins, of this concern, says that the company is swamped, and ought to be turning out at least fifty engines a day to keep up with orders. There are now 350 men on the payroll, which is a third more than ever before. Two 10-hour shifts are being used, and there is no let-up for Sundays.

Although the Hyatt Roller Bearing Co. is not strictly a Detroit concern, since its factory is in Newark, N. J., nevertheless the sales offices are here, and from it emanate reports of the biggest business in Hyatt history. Heavy specification increases have livened things up within a month, and the plant is running overtime, although prompt delivery is said to be possible due to large production facilities.

Naturally, there are many of Detroit's leaders on which nothing definite can be said due to the characteristic reticence, or conservativeness—call it what you like—of their officials. They believe in enjoying prosperity after the fashion of the ultra modest individual who prefers to hide his light under a bushel. Take Holley Bros., for instance. They are building an enormous number of carbureters each day, and are extremely busy, but do not care to be quoted.

**Other Plants Rushed**

Then there is the big Northway plant which is making well over 100 motors a day, and is working day and night shifts. Edmunds & Jones, specialists in lamp manufacture, are very busy, as are the body plants, such as Wilson, Fisher, Griswold, Briggs, etc. The Kelsey Wheel Co. is backward about talking, but is working to capacity. The McCord Mfg. Co. has all it can do to fill orders for its radiators and other automobile specialties, and the Sterling Motor Co. is very active.

LANSING, MICH., April 24—Because of rush orders which must be completed by May 1 for foreign shipment it has become necessary to work the plant of the Auto Body Co. to capacity. Several departments are being operated 24 hours a day, while other departments are being operated overtime. The company is employing more men this spring than formerly and is making use of added equipment, new buildings and new machinery.

ALLEGAN, MICH., April 24—The Blood Brothers' Machine Co. is working 24 hours a day, 6 days a week, turning out parts for the new Cornelian car. Within a few days the company will be turning out the completed cars in larger quantities. Modern machinery has been installed in the plant and one of the features in making the car is the fact that the body enamel is baked in one operation.

# Outline of System for Standardizing Spring Suspension

(*Continued from page* 767)

has the advantage of making traction quite secure on slippery and other difficult ground and probably can take the place of 4-wheel-drive construction to a very considerable extent if not entirely, constituting a much simplified means for attaining the same ends that are sought to be accomplished by driving all the wheels. For motor ploughs it could also be seriously considered, as in fact it was designed for that purpose in the first place. Its most conspicuous drawback is that a sharp braking movement has the effect of raising the vehicle body for the moment. It is an application of the much derided wheel-within-a-wheel principle, which, however, apparently is the only principle by which secure traction can be obtained in a compact manner and without cumbersome accessories when friction fails.

In the applications of this principle which have been tried in the past the traction qualities have been demonstrated under the worst surface conditions but the wheels were not closely built and not fortified against end-thrusts or the hundreds of irregular movements to which a motor vehicle is subject. They were scarcely to be considered as wheels but rather as special devices for special conditions, on the order of the caterpillar traction system or of the huge traction blocks which are employed on the wheels of heavy artillery in the present scientific slaughter campaign of Europe.

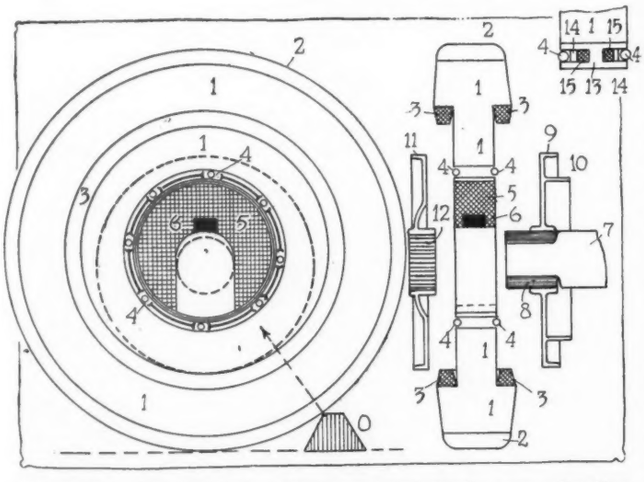



Fig. 8—Wheel designed to cushion horizontal shocks, secure traction and economize tires for heavy motor vehicles

A construction which should give the desired results is shown diagrammatically in its essential parts in Fig. 8. To the left is the central wheel 1 with the road tire 2, and the relatively small traction tires 3. It could be made of a non-vibrating fibrous material pressed in one piece, or it may be composed of many pieces of such material or of wood, or it could be a hollow steel casting—according to the specific purpose in each case. It could be made either with spokes or as a disk. It is mounted on a central steel ring containing the end-thrust bearings 4 and of such section as shown separately at 13. The balls project a little from the surface of 1 and roll—very slowly—on a slightly yielding backing, such as a steel ring 14 abutting against a ring of rubber compound 15 in the bottom of the groove containing the balls. The balls are caged.

Within ring 13 a thin metallic ring is free to revolve, exerting no pressure, so that graphite inserts for lubrication are sufficient. It contains block 5 made of cheap rubber compound or similar material, and this block holds an adjustment 6 serving to keep the wheel axle from bouncing at all when axle 7 is lowered by wear of traction tires 3.

Vehicle axle 7 with the flanged driving-wheel 9, on which brake drum 10 is cast and which is mounted on the fluted exterior of the bearing members 8, is inserted through the oblong opening in block 5, thereby bringing the driving-wheel 9 to rest upon traction tires 3, while the hub flange of 9 abuts against adjustment piece 6 above it. The weight of the vehicle bears down unrestrictedly upon the traction tires and continues to do so irrespective of wear. The other driving-wheel 11, whose hub 12 is also fluted internally, is now placed upon the outer end of bearing members 8 and is secured in its place, the two driving wheels abutting against the end-thrust bearings 4, and the wheel shaft is keyed to the hub of 11 in the usual manner. In case of chain-drive, brake drum 10 can be adapted to take the sprocket crown externally.

With reference to the subject in hand—the cushioning of the horizontal element of road shocks—it is evident that when the wheel strikes obstacle O the force is transmitted in the direction of the arrow and is decomposed at the interval between tires 3 and driving sheaves 9 and 11. The vehicle tends to climb the ascending curves of tires 3, thereby gradually absorbing the shock. Various considerations arise with regard to the action for one-sided shocks, but it is clear that the end-thrust bearings 4 will compel one wheel to follow the other to such an extent that the construction may be used for front wheels as well as for driving wheels.

# Week's Summary in Detroit

## First S. A. E. Standards Meeting in City a Success—Reports and Rumors in the Trade

DETROIT, MICH., April 27—It was Henry Souther who said recently in Detroit that the Society of Automobile Engineers is the periscope of automobiledom. In these war times that is a very appropriate metaphor, expressing as it does the sentiment of all who know anything at all about the great work which the society is doing for the industry. It is undoubtedly true that, like the submarine which depends upon the periscope for its existence, the industry could not well get along now without its engineers' organization.

The truth of this seemed more strikingly brought out last week here in Detroit than ever before, because the work of the standards committee S. A. E. was of a somewhat more popular nature than most of its previous labors, and it was thus brought home to the average man who is an automobilist. It made him realize that the engineering body stands ready to help not only in the design of cars, but in legislative matters, road matters, etc. This thought was expressed by several of those here at the session.

### First Standards Meeting for City

This was the first time the quarterly meeting of the standards committee of the Society was ever held in Detroit, strange as that may seem. The principal reason for that is that the chairman was not a Detroiter. But with the election of K. W. Zimmershied to the honor, the meeting naturally was brought here.

A strong feeling of satisfaction permeated the little group of some fifty engineers, for they were not compelled to travel many miles to enter into the deliberations of the various divisions holding sessions, and into the general meeting last Thursday. They could give the benefit of their knowledge to the committees without staying too long from their duties at their factories, and had the meeting been held in some other city, it is doubtful if as many of the prominent engineers and authorities on the several subjects could have been on hand, for at this, the busiest time of the year for the factories in Detroit, it would have been next to impossible for some of them to have gone away from the city for the 3 or 4 days which the meeting necessitated.

### Engineers Appreciate Opportunity

The Detroit engineers are fully aware of the advantages to the industry here of the work of the standards committee, as evidenced by the number of them who took part in the deliberations. One man was heard to say that he had not awakened to the vast amount of good that could come to himself and his company by taking an active interest in the work of the committee until after attending this meeting.

One other—it would be too bad to mention his name—he is too prominent—said he had awakened to its importance too late. It seems that in the deliberations of one of the divisions, he was invited to submit for the benefit of the committee certain special data bearing on the subject, and which he had obtained by exhaustive experiments. This he failed to do, through neglect or disinclination. Later the division made some recommendations to the Society which did not take into consideration the special needs of this certain company with the prominent but backward engineer. Had his special data been received, it might have helped his case. Now he takes an active part in the work

Several engineers who are really authorities on certain matters on which they have specialized took advantage of the meeting being in Detroit to attend the sessions and, though they were not members of these, they were welcomed into the deliberations. There is a growing spirit of co-operation, which was very evident at the Detroit meeting.

Several important changes have taken place in the trade here this week, Orlando Weber joining the Maxwell Motor Co. as assitant manager, S. H. Humphrey, factory manager of the Hupp company for the past 2 1-2 years, resigning to succeed H. H. Pinney third vice-president and works manager of the Chalmers organization and Alfred Thompson, for 2 years works manager with Maxwell, joining the production department of the Hudson factory.

Another development of the week was the formation of the Internal Gear Drive Assn., with the object of becoming a clearing house for information on this type of drive.

What has been assumed to be the new Packard has been seen on the road, and it certainly exhibits surprising speed and getaway. The jackrabbit seems to have nothing on the new job—if that is what it is. Anyway, J. G. Vincent, the Packard engineer who sits on the lid of the engineering department of the big company, has been driving a snappy affair on the roads of late, and rumor is rife. He has a habit of silently creeping up upon some innocent and unsuspecting car, and silently passing it at a remarkable clip before the surprised driver can speak to his mount and get started after the cloud of dust.

### New Packard Raises Rumors

Persistently it has been said that Packard will have a twelve-cylinder machine for next year, but there are some motor seers who disclaim this statement and do not believe that it will have any more cylinders than the present models boast. There is no doubt, however, that the price will be lower than any previous Packard models—probably somewhere in the neighborhood of $2,500.

No less speculation is going the rounds about the new car which the General Motors Co. will bring out in the middle of the summer under its own name. That it is to be a six is certain, and parts makers have received invitations to bid on 30,000 parts for such a car. Northway will build its engine, and now that Cartercar is to be closed out, this plant in all probability will be used for the purpose. There are several light sixes at under a thousand dollars on the market, and it is but logical for the General Motors organization to enter this field in competition. None of its properties now operating is making a car of this type, and there is undoubtedly a big demand for such a machine. The General Motors officials are alert to the situation, hence long since color was lent to rumors which are now accepted facts.

### Stewart-Warner's Ford Starter

Stewart-Warner is making a campaign just now on something new to come from their Chicago factories in the way of a starter for Ford cars. The belief of the writer is very strong that this is of the air variety, and supply men and manufacturers here are really very much interested to know just what the construction is. Of course, they may fool us and bring out an electric type, but we think not.

### Eight-Cylinder Men on the Jump

Trade circles are agog over the surprising way the eight-cylinder fellows are getting along. Those who were skeptical of the popularity of the multi-cylinder engine are coming around in great shape, saying that they "told you so all the time." Some remember that they didn't, but then that is a part of the grim past. The grim past in Detroit was last fall and winter, when though the manufacturers were doing more than many in other lines, they did not look for the sunshine that spring and early summer have brought. It looks as if production figures in more than one plant will touch high levels, and with conditions just right everywhere in the country, there is great excuse for the striking optimism which they display, practically to a man.

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## S. A. E. To Shift Headquarters

NEW YORK CITY, April 28—After the close of the current week the headquarters of the Society of Automobile Engineers will be at the Engineering Societies Building, 29 West Thirty-ninth street, instead of at 1790 Broadway. The offices will be on the sixth floor and about the same number of rooms will be used as are now held in the Rubber building. The advantages of being close to the other engineering organizations besides the use of the library in connection with the building to be occupied have been among the chief attractions.

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DETROIT, MICH., April 28—W. J. Murray was elected president and sales manager of the Splitdorf Electrical Co., of Detroit, at a directors' meeting held last week.

# Developments in the Jitney Bus Field

## San Diego Railway Interests Stop Development Till Jitney Is Curbed — People Want to Ride in Automobiles and Desert Trolleys for Buses — Reports from Other Sections

SAN DIEGO, CAL., April 17—One of the first sights for a visitor in this exposition city is a square block across from the Santa Fe station, filled with rows of rails and steel beams painted a vivid red and surmounted by this sign:

TO THE CURIOUS

What Is That Red Stuff?

*That is the bridge steel for extensions of the San Diego Electric Railway. All extensions and construction work have been suspended or abandoned on account of the competition of the* **unregulated** *Jitney Bus.*

*THAT'S WHY IT IS HERE*

*San Diego Electric Railway Conductors' & Motormen's Conference Committee*

About 150 jitney buses are operating in San Diego spasmodically. A development in the situation came last week when a great many of the jitneys abandoned their routes between the rush hours—from 10 a. m. to 4.30 p. m. and after 7 p. m.—and pulled down their 5 cent cards, hanging new ones advertising "Auto Bus For Hire." They stationed themselves on downtown corners where they offer to drive visitors anywhere at rates which they are willing to discuss. They underbid the taxi and big bus lines.

The San Diego Railway Co. is bitter against the jitney and has publicly announced that not another spike will be driven until the jitney is curbed. This will result in the failure of suburban development plans. The railway also is spreading the information that the state is losing between $300,000 and $400,000 a year because of the shrinkage of gross receipts of street railway companies which the state taxes at the rate of 5 1-4 per cent.

The jitney men are hanging on half-heartedly. There is an anæmic association of operators known as the San Diego Auto Bus Assn. The association has close to 110 members, each paying $2.50 initiation fee and $1 a month dues.

The San Diego Electric Railway Co. has been investigating the jitney movement closely and has even stationed checkers to report on the earnings of jitneys. It is said that jitney operators, when they observed that they were being watched, pulled down their signs and drove away to garages.

The street railway has found that many jitneys collected as much as $8 a day for fares. Where owners do not drive, they pay drivers 25 per cent. of the gross earnings. Gasoline has sold for 12 cents a gallon for a long time here, but this cheapness is offset somewhat by the hilly nature of San Diego.

An interview with W. Clayton, vice president and managing director of the San Diego Electric Railway Co., elicited this information:

"In 1901 San Diego had a population of 17,500. Today we have about 85,000, exclusive of exposition visitors. A great many people come here to live because of the climate. They have money and own automobiles. With hard times in the east, these people have had their security incomes reduced and it is from this class that many of the jitneys are coming.

"We had jitneys first last July but did not feel the result in reduced street car fares until about October. Now we are suffering.

"The state of California will lose in taxes at the present rate between $300,000 and $400,000 a year, being 5 1-4 per cent. of the gross receipts the jitney takes away from the street railways. In other words, the street railway companies, which maintain regular schedules over long distances, day and night, pay 5 1-4 per cent. of their gross receipts in taxes to the state, while the jitney bus, which runs over short distances when it is in good repair and its driver is in the mood, is costing the state about a third of a million dollars a year in taxes without protecting its passengers or providing definite service or earning its operators a decent living wage.

"People ride in jitneys because of the novelty of riding in an automobile. In our investigation we find that many are willing to walk five or six blocks from a jitney terminus where they would regard a walk of three blocks from a street car line as an iniquitous oppression. You find people all over California willing to ride in jitneys and sit on strangers' laps. They never would do that in a street car.

"Jitneys will run nearly every street railway company on the coast to the wall unless they are regulated so that competition is equitable. A measure has passed the senate providing for a tax of $12.50 a seat for jitney buses. I do not believe this is half enough. When it comes to bonding a jitney bus, the surety companies are chary because with an irresponsible or discontented jitney driver many accidents might result. This should be taken care of by legislation.

"There is no question that in some places the jitneys have done a service to the people by punishing autocratic street railways companies. This is not the case in San Diego where our company has absolutely no watered stock, is controlled by the Spreckles brothers, and has always been more than willing to extend lines and assist in the development of San Diego into the large city that it some day is bound to become.

"But we won't drive another nail until we know where we stand. All line extension is stopped. We will forfeit franchises before we will expand our system with the present jitney bus competition protected by the state."

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### $500 Bond Per Seat in R. I.

PROVIDENCE, R. I., April 24—The Rhode Island legislature adjourned last night and in its closing hours the jitney bus bill was jammed through so that it provides for a bond of $500 for each passenger the vehicle in use can carry. As originally passed by the Senate it was $750 a passenger, but the lower branch knocked off $250. The cities and towns may make regulations governing the speed, streets used, etc.

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### Gotham Jitney Wins City Suit

NEW YORK CITY, April 26—The suit brought by the City of New York against the Peoples 5-cent Bus Corp., for demonstrating its electric buses on the city streets was dismissed by Justice W. Lynn in the Third District Municipal Court today.

The city brought suit to recover a penalty for a violation of section 41 of the city ordinances, which prohibits the use of trucks, vans or wagons in the Borough of Manhattan for advertising purposes.

The Peoples 5-cent Bus Corp., a subsidiary company of the Electro Coach Co., New York City, has been endeavoring to obtain a franchise from the Board of Estimate and Apportionment for the operation of a line of electric motor truck buses over certain specified routes in the Borough of Manhattan. The latter body has been very slow in passing upon the application for the franchise and in the meantime, the bus company ran several of the trucks up and down on the most important thoroughfares without carrying any passengers merely to bring them before the public eye.

Two jitney taxicabs started running on Saturday, one machine going from Seventy-second street and Broadway and the other at Fifty-ninth street and Fifth avenue. The charge is 10 cents a mile. The machines used are seven-passenger touring cars.

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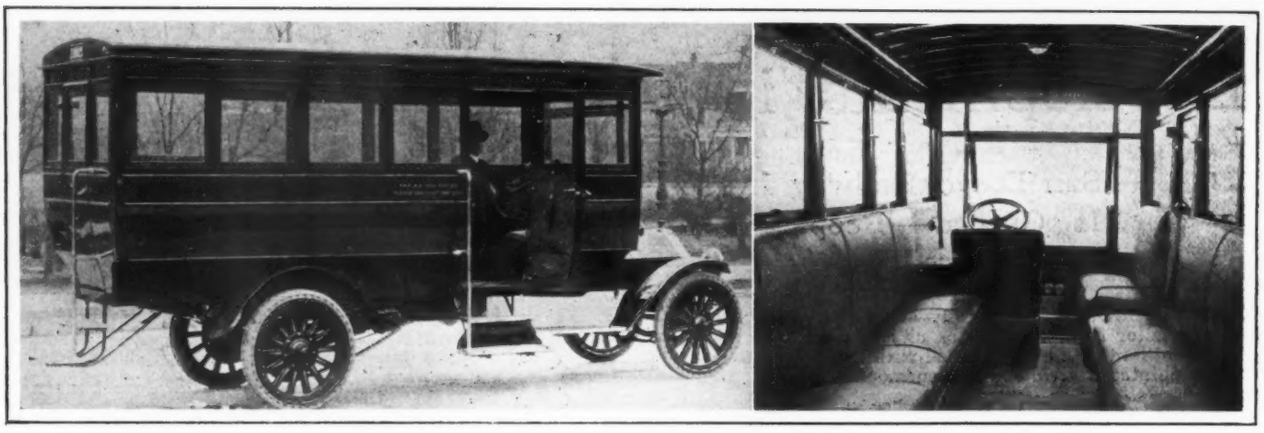
### Jitney Bus Bill Hits New York City

ALBANY, N. Y., April 22—By a last minute change made in the Thompson jitney bus bill, which was passed in the Senate and Assembly, New York City will be affected by its provisions.

At first the bill had a provision it should apply only to cities of the first class, with a population of 750,000 or under. It was changed to apply to any city.

By the terms of the bill any vehicle carrying passengers



Exterior and interior views of Stegeman twenty-passenger jitney bus mounted on the 1 1-2-ton standard truck chassis

for 15 cents or less must get a certificate of public convenience and necessity from the Public Service Commission and the consent of the local authorities before operating, if the latter demand it, and be subject generally to the terms of the railroad law, if in competition with any other common carrier.

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## Jitneys Reduce Trolley Revenue $2,000 Daily

WASHINGTON, D. C., April 24—After spending a month observing the operation of jitney bus lines in the south and west, Conrad Syme, corporation counsel of this city, has returned and is now making an elaborate report on his observations for the public utilities commission. He reports that the operation of jitney buses in New Orleans, Los Angeles, San Francisco, Kansas City and St. Louis is reducing the revenues of the street railway companies more than $2,000 a day in each of these cities.

Syme said that the jitney bus is not a fad or a mere transient thing, but that it has been called into service by demand for a more immediate and elastic form of transportation, particularly in the business parts of cities. The buses, he declares, are receiving strong popular support. He rode and talked, he said, with scores of jitney bus operators, all of whom claimed to be operating their cars at a profit, their average receipts being from $6 to $8 a day. The cost of operation, he was informed, is about $3.50 a day, which includes $1 a day laid aside for depreciation.

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## St. Louis Jitneys to Put Up Rates

ST. LOUIS, MO., April 24—Jitney owners in this city will soon raise their rates from 5 to 10 cents. A study of upkeep costs has convinced the owners that carrying passengers a distance of 4 miles for 5 cents each is a losing venture. It costs 7 1-4 cents a mile or 29 cents for the 4 miles according to estimates given by the manager of one of the jitney lines. It would be necessary to carry six passengers on each trip to cover the operating cost but this is seldom possible, because there are hours during the day when trips are made with three and four passengers, and during the rush hours of the morning return trips from downtown are often without a passenger.

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## $10 Per Seat Annually in Savannah

SAVANNAH, GA., April 22—An ordinance regulating the operation of jitney buses and putting a tax upon them has been passed by the city council. Every owner will be required to pay an annual tax of $10 a seat for every machine in operation. In addition they will be required to give an indemnity bond of $5,000. Buses will not be required to run on schedule, but will be required to operate along given routes and machines placed in service on one route will not be permitted to shift to another to get the benefit of an increased travel in that section.

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## Stegeman Jitney Bus Makes Appearance

MILWAUKEE, WIS., April 26—The first real jitney omnibus of the large-capacity type to make its appearance in Milwaukee is the 20-passenger car built for W. B. Hood by the Stegeman Motor Car Co., in collaboration with the Chas. Abresch Co., Milwaukee, body builder. Mr. Hood is making an experiment, which, if successful, will result in the purchase of additional buses. On the first day the new bus was in service, the total receipts were $25.50, running day and evening.

A standard 1 1-2-ton Stegeman truck chassis is used for the Hood bus. This employs a four-cylinder Continental-Stegeman motor with 3 3-4-inch bore and 5 1-4-inch stroke. The wheelbase is 127 inches. Final drive is by double chain from jackshaft. A Gray & Davis lighting equipment, but no starting equipment is used. For winter use, heating registers are placed in the floor of the car and connected with the exhaust manifold.

The body is 17 feet long, 6 feet high and 6 1-2 feet wide. The driver's seat is separate and at the left. All doors are operated by levers at the driver's right. The bus is of the pay-as-you enter type and the fare box is placed conveniently at the entrance in view of the driver, but out of his reach. Two dome lights in the ceiling illuminate the car. There is a push button above each seat. The seats run fore and aft. The rear door, for exit purposes, is placed in the center of the panel. Sheet metal is liberally used in the construction. The car is equipped with Motz cushion tires front and rear. Price, complete, is $2,700.

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## Jitney Bus Holds Sway in Grand Rapids

GRAND RAPIDS, MICH., April 26—The jitney situation still continues to hold the center of the stage in this city with the jitney men apparently having the best of the matter up to date, Mayor G. E. Ellis having announced that if the common council passes the drastic ordinance proposing large bonds, a higher license fee and prescribing difficult regulations, he will veto it.

The jitney owners have perfected their organization under the title of the Grand Rapids Jitney Bus Assn., with the following officers:

President, J. W. Sherwood; vice-president, F. P. Nichols; secretary, G. F. Barnes and treasurer, E. R. Thompson.

There are now nearly 200 jitneys in regular operation.

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ATLANTIC CITY, April 27—After much discussion, the Atlantic City Council passed an ordinance for the regulation of jitney buses on Friday last. License was finally fixed as follows:

For five-passenger cars, $75; for seven-passenger cars, $100; for cars with more than seven and not more than ten passengers, $125, and for cars carrying more than ten, $150.

This is a reduction from the ordinance which was originally drawn which ranged from a $100 to $200 license fee.

Bond has to be given by the owner of each car operated at $5,000 for each car.

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LOS ANGELES, CAL., April 23—The jitney bus operators of Los Angeles claim an overpayment on bus license fees to the amount of $27.000 and the city attorney is of the opinion that it lies entirely within the discretion of the City Council as to whether this amount shall be refunded or not.

The jitney men formerly paid a license fee of $15 per quarter. The city attorney ruled that they should be compelled to pay but $7.50 per quarter.

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WATERBURY, CONN., April 24—Universal transfers, twenty-five tickets for $1, and operation of cars from 5:30 a. m. to 12:30 a. m. was announced today by the Waterbury Jitney Service, Inc. Operations will begin next week with thirty jitneys, and will be increased to 200 within 30 days.

# Factory Miscellany

**INTER-STATE Factory Busy**—The Inter-State Motor Co., Muncie, Ind., this week sent out one of the largest single shipments of automobiles made this year by an Indiana manufacturer. The shipment consisted of twenty-one touring cars and nine roadsters, valued at $30,000, and was sent to the Fred C. Huffman Motor Car Co., Omaha, Neb. At the present time the daily output of the factory is between eighteen and twenty cars, but it is hoped that it will be increased to twenty-five by May 1. The factory is about 400 cars behind on its orders. On April 22 the Kanouse Automobile Co., Indianapolis, Ind., distributor, and the Inter-State company held the first "drive-away-day" ever held in that state. Fifty-six dealers and their friends from various points in that state and one from Ohio drove away from the factory in thirty-one new cars.

**International Motors to Build**—The International Motor Co., New York City, will build additions to its Saurer plant in Plainfield, N. J.

**Mosler to Add**—A. R. Mosler & Co., Mt. Vernon, N. Y., has completed plans for an addition to its factory on Wakefield and Webster avenues.

**Hudson's New Storehouse**—The Hudson Motor Car Co., Detroit, Mich., is taking bids on a structural steel storehouse, one story, 20 by 200 feet.

**Packard's $20,000 Addition**—The Packard Motor Car Co., Detroit, will spend $20,000 for a two-story, 52 by 40, addition to its plant located on Concord avenue.

**Spokane Firestone Moves**—The Firestone Tire & Rubber Co., Spokane, Wash., has moved to 127 West First avenue. The new quarters contain 10,000 feet of floor space.

**Zinc Co. to Make Tires**—The New Jersey Zinc Co. will shortly commence the erection of a rubber tire factory in connection with its plants at Palmerton and Millport, Pa. These tires are composed of 55 per cent. of zinc.

**Kelsey Wheel's Second Addition**—A two-story addition, 80 by 253 feet, costing $28,000, is to be started upon the plant of the Kelsey Wheel Co., manufacturer of automobile wheels in Detroit. This is the second addition to be announced by the company within the last 3 weeks.

**Ford Buys Washington Land**—Deeds were placed on record this week whereby the Ford Motor Co., Detroit, becomes the owner of the property at the northwest corner of Pennsylvania avenue and John Marshall Place. The ground is 150 by 200 feet, and it is understood a six-story assembly plant will be erected in the near future.

**Owego Plant Sold for $2,000**—Referee in Bankruptcy A. B. Kellogg, of 115 Broadway, New York City, sold on April 15 the office fixtures of the defunct Owego Car Co., Owego, N. Y., for $58.50 and the good will, stock and machinery, sold in a lump, brought $2,000. The successful bidder was William Wooster, representing the Automobile Surplus Stock and Supply Syndicate.

**Harrison Radiator Co. Buys Plant**—The Harrison Mfg. Co., Buffalo, N. Y., manufacturer of automobile radiators, on Saturday purchased for consideration said to be $23,500 the plant of the American District Steam Co. in Lockport, N. Y. The radiator concern for some time has occupied the building, and now that the company has purchased the structure an addition to the plant is being constructed to care for increasing business.

**Sheboygan's Brass Goods Plant**—Phillipp Meyer of Port Washington, Wis., until recently associated with the engineering staff of the Falls Machine Co., Sheboygan Falls., Wis., has organized the Meyer Mfg. Co. and will establish a brass foundry and brass goods plant in Sheboygan Falls. The concern has leased the warehouse building opposite the C. & N. W. depot.

**Savage Tire's New Addition**—The Savage Tire Co., San Diego, Cal., is erecting an addition to its factory at Main and Sicard streets, which will double its facilities. The new building is 40 feet by 230 feet, and will cost $17,320. It is to be of cement. When the building is completed in 10 weeks, 250 additional employees will be engaged, adding $250,000 to the tire company's payroll. The roll of workers numbers 250 now.

**Waukesha Working Full Time**—The Waukesha Motor Co., Waukesha, Wis., has started work on adding twenty-four units to its plant to supplement four units recently added. The plant has been operating 24 hours a day for some weeks past and is obliged to maintain a record production indefinitely because of the unusual demand for Waukesha motors from automobile and truck builders, notably the Sternberg Motor Truck Co., Milwaukee, which is busy on large war orders.

**N. Y. Spring Co. Buys**—The E. R. Merrill Spring Co., New York City, manufacturer of automobile springs, located on the middle west side, has concluded negotiations for the purchase of two adjoining parcels for the enlargement of its plant. One parcel is located at 525 West Twenty-seventh street, a two-story building, and the other a three-story building at 531 West Twenty-seventh street. The company now occupies 525 and 529 on the same street, extending through to 526 to 532 West Twenty-eighth street, and with the new acquisitions controls a plot with frontages of 95 and 100 feet respectively.

## The Automobile Calendar

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| April 30, May 1-2 | Portland, Ore., Track Races; Northwest Automobile Assn. |
| May 1 | Irvington, N. J., track meet; O. V. Matthews. |
| May 1 | Philadelphia, Pa., Quaker City Motor Club, Eighth Annual Sociability Run to Atlantic City. |
| May 5-6 | Detroit, Mich., Motor Truck Convention of the N. A. C. C., Hotel Statler. |
| May 8 | Salem, Ore., Track Races; Northwest Automobile Assn. |
| May 15-16 | Vancouver, Wash., Track Races; Northwest Automobile Assn. |
| May 15-16 | Columbus, O., Track Race, Columbus Automobile Club. |
| May 17 | Spokane, Wash., Show, Davenport Hotel. |
| May 17-18 | Boston, Mass., A. A. A. Annual Meeting. |
| May 18-19 | Boston, Mass., annual meeting of the American Automobile Assn. |
| May 27 | Chicago, Ill., Sociability Run of Chicago Motor Club to South Bend, Ind. H. H. Robinson. |
| May 29 | Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway. |
| May 29 | Philadelphia, Pa., Stone Harbor Memorial Day Run from Philadelphia. |
| May 29-30 | Seattle, Wash., Track Races; Northwest Automobile Assn. |
| June 3 | New York City, 11th Annual Automobile Outing for Orphans; Orphans' Auto. Day Assn. of N. Y. |
| June 9 | Galesburg, Ill., 200-Mile Race, Galesburg District Fair Assn. |
| June 12 | Brighton Beach, Track Race; E. A. Moross. |
| June 14-17 | Detroit, Mich., Summer Meeting of the Society of Automobile Engineers and Start of Cruise to Georgian Bay. |
| June 19 | Chicago, Ill., 500-Mile Race, Chicago Speedway. |
| July 3 | Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn. |
| July 4 | Visalia, Cal., Road Race; Tulare County Automobile Assn. |
| July 4-5 | Tacoma, Wash., Road Race, Tacoma Speedway Assn. |
| July 5 | Omaha, Neb., Speedway Races, Omaha Motor Speedway. |
| Aug. | Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee. |
| Aug. 2-3 | San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention. |
| Aug. 20-21 | Elgin, Ill., Road Race. |
| Sept. | Indianapolis, Ind., Fall Show, Indiana State Fair. |
| Sept. | Peoria, Ill., Second Northwestern Road Congress. |
| Sept. 6 | Providence, R. I., Speedway Race; F. E. Perkins. |
| Sept. 6 | Detroit, Mich., Speedway Race; Detroit Speedway Club. |
| Sept. 13 | Oakland, Cal., Pan American Road Congress. |
| Sept. 20-25 | San Francisco, Cal., International Engineering Congress. |
| Oct. 1-2 | Trenton, N. J., Track Races; Inter-State Fair. |
| Oct. 6-16 | New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace. |
| Dec. 31 | New York City, Show; Grand Central Palace. |
| Jan. 22, 1916 | Chicago, Ill., Show; Coliseum. |

# The Week in  the Industry

## Motor Men in New Roles

**DORT Advertising Mgr.**—R. B. Dort, formerly manager of foreign advertising for the Albany Knickerbocker Press, has been appointed advertising manager of the Dort Motor Car Co., Flint, Mich.

**Whittemore Autocar Advertising Mgr.**—H. L. Whittemore has been appointed advertising manager of the Autocar Co., Ardmore, Pa.

**Beatty Goodyear Branch Mgr.**—S. M. Beatty has been appointed manager of the Goodyear Tire & Rubber Co.'s branch in Providence, R. I.

**Lawrie Makes a Change**—G. H. Lawrie, for some time manager of the Boston branch of the Pennsylvania Tire Co., has resigned and bought an interest in the Mitchell & Smith Co., Boston.

**Hunt Heads Philadelphia McNaull**—The McNaull Tire Co., Toledo, O., has established a store and service station at 720 North Broad street, Philadelphia, Pa., with D. E. Hunt, manager.

**Stimson Bowers Tire Mgr.**—L. S. Stimson, formerly manager of the Batavia Tire & Rubber Co., has been appointed manager of the L. S. Bowers Tire Co., Philadelphia, Pa., 126 North Broad street.

**Finger Sales Mgr.**—F. J. Finger, has been appointed sales manager for the H. C. Skinner Co., Portland, Ore., distributor of Maxwell cars. Mr. Finger's territory will include all of Multnomah County.

**Love's New Appointment**—C. M. Love, formerly of the Atlanta (Ga.) branch of the Studebaker Corp., has been appointed special representative of the same corporation in Virginia and North and South Carolina.

**Diers Increases Scope**—C. L. Diers, formerly manager of the Indianapolis (Ind.) branch of the Goodyear Tire & Rubber Co., is now manager of the Indianapolis district, including the branches at Louisville, Cincinnati, Columbus and Dayton.

**Federal Truck's New Sales Mgrs.**—The Federal Motor Truck Co., Detroit, Mich., has appointed L. C. Long and E. D. Jones district sales managers. Long will look after eastern territory and Jones after Ohio.

**Fry Detroit Empire Tire Mgr.**—J. B. Fry, for 5 years rubber expert in the United States Navy, has been appointed manager of the Detroit (Mich.) branch of the Empire Rubber & Tire Co., 842 Woodward avenue.

**Lees Oakland District Supervisor**—R. C. Lees has been appointed district supervisor for the Oakland Motor Car Co., Pontiac, Mich., and will make his headquarters at Cleveland with the Adams-Oakland Co.

**Crittenden Heads Regal Dept.**—G. A. Crittenden, who was sales and advertising manager of the Krit Motor Car Co., Detroit, Mich., has become head of the sales promotion department of the Regal Motor Car Co., Detroit.

**Slosson Firestone Rep.**—Steward Slosson has been appointed Pacific Coast representative of the Firestone Tire & Rubber Co., whose duty it shall be to attend all speed events and interest drivers and motorcycle riders in the use of Firestone tires.

**Ide Joins Simms**—J. H. Ide, who for a long time has been connected with the Detroit branch of the New Departure Mfg. Co., Bristol, Conn., has received the appointment of western sales manager for the Simms Magneto Co., East Orange, N. J.

**Eldredge Puritan Advertising Mgr.**—F. M. Eldredge has been appointed advertising manager for the Puritan Machine Co., Detroit, Mich. L. A. Cuson has joined the company and is organizing a quick service department for repair parts for Krit cars.

**Williams Lozier Traveling Representative**—H. W. Williams, who has been in charge of the service department of the Lozier Motor Co., Detroit, Mich., has been made traveling sales representative for the Middle West. M. E. Gildersleeve has succeeded him.

**Lubeck Joins Maxwell**—E. M. Lubeck, former wholesale manager for the Studebaker Corp. in Chicago, Ill., and more recently with the Oakland dealer in that city, has joined the sales forces of the Maxwell Motor Co. as assistant to C. R. Newby, supervisior of Zone 3.

**Weber Makes Change**—H. E. Weber, who has been representing Stewart-Warner Speedometer Corp. throughout the West during the last 5 years, has resigned and is now in charge of the Stewart-Warner Speedometer Service Co., Milwaukee, Wis., at 188 Fifth street.

**Gordon Heads Newcastle Rubber Co.**—A. E. Gordon has taken charge as general manager of the Newcastle Rubber Co., Newcastle, Pa., recently incorporated with a capital stock of $500,000 to manufacture automobile tires. The plant will have a capacity of 1,000 tires and 1,500 tubes daily.

**Blair Pennsylvania Tire Mgr.**—George Blair has been appointed Philadelphia, Pa., branch manager of the Pennsylvania Rubber Co., Jeannette, Pa., 651 North Broad street. Increasing business has necessitated the securing of larger quarters and on May 1 the company will remove to 306 North Broad street.

**Tverdahl Winton's Milwaukee Mgr.**—O. M. Tverdahl has been appointed manager of the Milwaukee branch of the Winton Motor Car Co., Cleveland, O., to succeed J. I. Miller, who has been in charge since the establishment of a factory branch in this city. The branch is now located at 503-507 Broadway.

**Rundell Oldsmobile Mgr.**—C. C. Rundell has been appointed manager of the Oldsmobile sales for Marion County, Ind. He was formerly branch manager for the Peerless company and was connected with the sales department of the Premier for 5 years, where he took all the prizes offered by that organization for salesmanship.

**Raymond in New Capacity**—A. H. Raymond, who for the past 10 years has been continuously engaged in selling Packard cars, last week took charge of the truck department of Earle C. Anthony, Inc., Southern California, distributor for the Packard with headquarters at Los Angeles. Raymond was formerly connected with the Packard agency in San Francisco.

**Woodin Hollier District Sales Mgr.**—T. C. Woodin has been appointed district sales manager of the Lewis Spring & Axle Co., manufacturer of the Hollier Eight in Jackson, Mich. He will cover Missouri, Kansas, Nabraska and Oklahoma, with headquarters at Kansas City. A. J. Pray is manager of the Gate City Motor Co., Kansas City, recently appointed distributor of the Hollier car.

**Hyman Cole Advertising Supervisor**—H. R. Hyman has been appointed advertising supervisor of the Cole Motor Car Co., Indianapolis, Ind. He will have direct charge of all the advertising of the Cole company, and will assume his new duties the coming week. Mr. Hyman has been director of the publicity for the Bobbs-Merrill Co. for the last 3 years, and also has engaged in newspaper work.

**Ivor McCulla Joins Knox**—Ivor McCulla, brother of William R. McCulla, assistant chief engineer of the Knox Motors Co., Springfield, Mass., has been placed in charge of the experimental department of the Knox company. Mr. McCulla was connected with the Lozier Motor Co. and the Packard Motor Car companies in Detroit, and left recently to take up his new duties at Springfield.

**Clarke Takes Over Business**—W. J. Clarke has taken over the business of the Winsor-Clarke Co., Detroit, Mich., manufacturers' agents. He will continue to handle the products of the Auto Parts Co., Providence, R. I.; the Fitzgerald Mfg. Co., Torrington, Conn., makers of horns; the Spencer-Smith Machine Co., Howell, Mich., makers of pistons, and the Walden Mfg. Co., Worcester, Mass., makers of wrenches.

**Fisher Heads Chicago Chase**—R. M. Fisher will manage the new branch of the Chase Motor Truck Co., established in Chicago, Ill. C. E. Reynolds continues as division supervisor of agencies, covering Illinois, Iowa, Missouri and Minnesota. Headquarters will be in Chicago. C. E. Collard, formerly manager of the Mack-Sauer branch in Boston, has joined the Chase organization, with headquarters in New York City. He will be supervisor of agencies out of the Chase branch under the direction of F. B. Porter, of the New York City branch.

**Miller Heads Milwaukee Wheel Co.**—W. M. Swift Miller, for many years associated with the Allis-Chalmers, Westinghouse and Industrial Controller companies as publicity, advertising and sales manager, has purchased a large interest in the T. S. Wheel & Mfg. Co., Milwaukee, which recently began to market a new type of all-steel resilient wheel for motor cars and trucks after several years of experimentation and perfection. Mr. Miller has been elected president and general manager of the company. The present capacity of the plant is 2,000 wheels monthly.